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## A MONOGRAPH OF THE GENUS *SIDALCEA*<sup>1</sup>

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### TABLE OF CONTENTS

#### I

	Page
History of the genus . . . . .	117
General morphology . . . . .	120
Generic relationships . . . . .	124
Specific variations, relationships, and general distribution . . . . .	125
<i>Hesperalcea</i> . . . . .	128
<i>Malastralcea</i> . . . . .	128
<i>Eusidalcea</i> . . . . .	129
<i>Perennes</i> . . . . .	129
<i>Annuae</i> . . . . .	134
Abbreviations . . . . .	136

#### II

Taxonomy . . . . .	136
List of exsiccatae . . . . .	218
Index to species . . . . .	225

#### I

### THE HISTORY OF THE GENUS

The genus *Sidalcea* was proposed by Dr. Asa Gray<sup>2</sup> in 'Plantae Fendlerianae' in 1849 with eight species, five of which were segregates from *Sida*. The name was compounded from *Sida*

<sup>1</sup> An investigation carried out at the Missouri Botanical Garden in the Graduate Laboratory of the Henry Shaw School of Botany of Washington University and submitted as a thesis in partial fulfillment of the requirements for the degree of doctor of philosophy in the Henry Shaw School of Botany of Washington University.

<sup>2</sup> Gray in Mem. Am. Acad. N. S. 4: 18. 1849 (Pl. Fendl. 18. 1849).

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and *Althaea*, because of some fancied resemblance to the latter genus. The annuals constituted the typical section of the genus, and *S. diploscypha* must be interpreted as the type species.

During the next three decades very few new species were described and some of these were reduced to synonymy. Watson<sup>3</sup> in the 'Botany of California' recognized only five species indigenous to California. In 1885 Dr. Edward L. Greene<sup>4</sup> proposed six new Californian species and reinstated certain ones which had previously fallen to synonymy, thus making a total number of thirteen in his 'Synopsis.' In 1887 Gray<sup>5</sup> gave his "tentative distribution" of the perennials which he states "are hard to discriminate," adding that "those indicated by Prof. E. L. Greene may probably be maintained, as also one or two more." Greene,<sup>6</sup> in 'Flora Franciscana,' in 1891 added nothing of importance except the creation of the section *Hesperalcea* for the anomalous *S. malachroides*, which Gray<sup>7</sup> some time earlier had transferred from *Malva*.

E. G. Baker<sup>8</sup> in his 'Synopsis Malveae' accepted and listed all North American species known at that time, thus recording a total of eighteen, exclusive of three little-known South American species described by Turczaninoff<sup>9</sup> in 1863.

The latest and most comprehensive treatment of the genus is that given by Gray,<sup>10</sup> in the 'Synoptical Flora of North America' of 1897. Relationships within the group are indicated, based largely upon duration of growth, habit, time of flowering, inflorescence, staminal phalanges, carpels, and pubescence. The earliest collections are cited and the geographical distribution as then known is given.

Since 1897 the number of species of *Sidalcea* has been more than doubled by the publication of descriptions of new species and varieties from western North America. Those of California

<sup>3</sup> Brew. & Wats. Bot. Calif. 1: 83. 1876.

<sup>4</sup> Greene in Bull. Calif. Acad. Sci. 1: 74. 1885.

<sup>5</sup> Gray in Proc. Am. Acad. 22: 286. 1887.

<sup>6</sup> Greene, Fl. Francis. 102-106. 1891.

<sup>7</sup> Gray in Proc. Am. Acad. 7: 332. 1868.

<sup>8</sup> E. G. Baker in Jour. Bot. 29: 51. 1891 (Synopsis Malveae, 29. 1894).

<sup>9</sup> Turczaninoff, Bull. Soc. Nat. Mosc. 36: 566. 1863.

<sup>10</sup> Gray, Syn. Fl. N. Am. 1: 302. 1897 (edited by B. L. Robinson).



have been given careful consideration by Jepson,<sup>11</sup> and those of the Rocky Mountain region have been treated by Rydberg.<sup>12</sup> However, these authors have included less than half of the number of described species.

In view of this situation and because of the vast amount of material that has accumulated in all the larger American herbaria from recent collections in western North America, and because of the great variation within the genus, it was thought advisable to study the genus *Sidalcea* in the light of all available material. The author has endeavored to explain the "perplexing variability" within the group by a close consideration of the possible ecological factors influencing variation, and to correlate this with the geographical distribution. An attempt has been made to clarify the hitherto involved synonymy, to formulate a workable key which shows the natural relationships, and to delimit the species sufficiently for easy recognition in the field and ready organization in herbaria.

Thanks are due those in charge of the herbaria of the following institutions for the loan of material in connection with this study: Gray Herbarium of Harvard University, United States National Museum, University of California, California Academy of Sciences, The Academy of Natural Sciences of Philadelphia, the University of California at Los Angeles, Pomona College, Rocky Mountain Herbarium (University of Wyoming), Leland Stanford, Jr. University, Oregon Agricultural College, University of Oregon, Herbarium of the University of Washington (deposited in the Washington State Museum), State College of Washington at Pullman, Willamette University, College of the Pacific, and A. O. Garrett Herbarium; also to those in charge of the herbaria visited: Field Museum of Natural History and Herbarium Greeneanum at Notre Dame University.

The author is indebted to Dr. George T. Moore, Director of the Missouri Botanical Garden, for the privileges of the herbarium and library of that institution. Sincere appreciation is expressed to Dr. Jesse More Greenman, Curator of the Missouri Botanical Garden Herbarium, for his helpful consideration and

<sup>11</sup> Jepson, Man. Fl. Pl. Calif. 628. 1925.

<sup>12</sup> Rydb. Fl. Rocky Mts. 558. 1917, and ed. 2. 558. 1922.

discussion of questions arising in connection with this monograph and for obtaining the loan of the abundant material examined; also to Dr. Mildred E. Mathias, Research Assistant, for invaluable aid in the preparation of the manuscript. Thanks are also due Dr. David H. Linder, Mycologist to the Missouri Botanical Garden, for the photomicrographs used in this publication, and to Dr. Roland V. LaGarde for the photographs of herbarium specimens.

#### GENERAL MORPHOLOGY

The members of the genus *Sidalcea* are either annual or perennial herbaceous plants, often becoming ligneous at the base, or even suffruticose, as in the subgenera *Malvastralcea* and *Hesperalcea*.

*Roots.*—The annuals, comprising about one-sixth of the species, have a slight tap-root with small fibrous lateral roots. The perennials have either a creeping rootstock, or a strong woody root which assumes various shapes due to the physical conditions of the soil, some strikingly horizontal in shallow soil, others fusiform or otherwise thickened.

*Stems.*—The stems are erect or decumbent at the base, sometimes rooting along the lower part, or creeping and rooting at the nodes. They are simple or branched, few or several, and if several often caespitose or subscapiform. The annuals range from one to nine decimeters in height, whereas the perennials may reach two to three meters. Some are slender and wiry, others stout, fistulous or rarely succulent. The surface may be glabrous, glaucous, or with varying degrees of hirsute or stellate pubescence. The older parts are less pubescent than the younger.

*Leaves.*—There is such a striking difference in the cut of the leaves (pl. 8, fig. 1), coinciding with their position on the stem, that it is necessary to use the terms basal, middle cauline, and upper cauline in order to give an accurate idea of this variation. The basal leaves are rarely present on the mature plant, particularly in the annuals. As a rule, if present, they are orbicular, semi-orbicular, or cordate, lobed or palmately parted, varying in width from one to ten centimeters or more. The sinus may be closed, truncate, or open. The middle cauline leaves are often larger than the basal leaves, of the same general outline but

more deeply cleft, the lobes or segments varying in shape and in the degree of lomentation. The upper cauline leaves are usually cleft almost to the base. The segments are narrow, entire or variously dentate. In appearance the surface may be green, glaucous, or cinereous. The leaves may be glabrous, pubescent, or puberulent, and the degree of pubescence differs on the two surfaces, usually greater (also more stellate) on the lower surface and on the veins. Young leaves are much more pubescent than older ones. The petioles may vary in length on a single individual from a few millimeters to at least five decimeters. There are no special markings on the petiole, and the pubescence is similar to that on the basal portion of the stem, or on the leaf-surface. There are two herbaceous or membranous, green or purplish stipules which are ovate, lanceolate-acuminate, linear, subulate, or filiform when parted, as in *Sidalcea diploscypha*, and may be glabrous, pubescent, or merely ciliate.

*Pubescence.*—In common with other Malvaceae the pubescence is predominately of the stellate type, and important in specific delimitation. There are, however, long simple or geminate hairs to which the term hirsute has been applied in this paper, but this condition is often intermixed with some form of radiate hairs. The branched hairs may be geminate, triradiate, or multiradiate, long or short, sparse, or if close forming a dense tomentum. If exceedingly short and minute, visible only under a lens, or harsh to the touch the term puberulent is used. At the base of the stems and on the petioles the hairs are often retrorse or deflexed, and on the leaves they are frequently appressed, particularly on the upper surface.

The form and degree of pubescence vary with the ecological and geographical conditions. Where there is abundant moisture from either the soil or atmosphere (fogs near the coast) or both, the prevailing type of pubescence is hirsute (*Sidalcea malvaeflora* and *S. neo-mexicana*), with or without an underlying layer of stellate hairs, especially in the inflorescence, or the plant may be glabrescent (*S. candida* and *S. Hendersoni*). In the more arid regions the prevailing pubescence is stellate, which may be dense, sparse, or so short as to be considered scurfy (some forms of *S. asprella*). In a transition region from much available moisture

to less moisture, or, as in the case of the annuals in the Sacramento Valley, where there is a short rainy season, then dryness, there is a mixture of the two prevailing forms of hairs. In a physiologically dry soil (subsaline) no pubescence develops except on the inflorescence, as in the typical *S. rhizomata* of Jepson. Those plants from alkali regions (types previously described as *S. nitrophila*, *S. confinis*, and *S. parviflora*) show a reduction of leaf surface, almost no hairs, and a whitening of the entire surface, with some indication of a thickening of the cuticle.

*Inflorescence*.—The inflorescence is terminal, few- to many-flowered, racemose, spicate, or subumbellate, rarely glomerate, either simple or paniculate, and rarely subscapiform. The rachis, bracts, pedicels, and calyx usually have the same type of pubescence increasing in density toward the calyx, presenting characters of specific value. The bracts are ovate, deltoid, lanceolate, linear, subulate or setulose, and vary in length, rarely exceeding the pedicels after anthesis. They may be simple, bidentate or bifid (rarely trifid) to a greater or less degree, pubescent or merely ciliate, colorless, green, purplish, or purple-tipped. In a few cases they are membranous or even scarious. The pedicels are usually shorter than the calyx, although in some species they exceed it, especially in fruit (*S. neo-mexicana*). This character, therefore, is not of specific diagnostic value. The flowers are perfect or gynodioecious (pl. 5, figs. 1 and 2) (that is, with perfect and pistillate flowers on separate plants), and gynodimorphic (pl. 5, figs. 2 and 7) (that is, the pistillate flowers smaller than the perfect, with sterile or abortive stamens), and proterandrous, an adaptation for cross-pollination.

*Calyx*.—Bracteoles are present only in the subgenus *Malvastralcea*, although their presence has been reported in literature for the subgenus *Hesperalcea*. The calyx has a short tube, with a five-lobed limb, and may or may not be accrescent. The lobes are valvate, short-deltoid and almost obtuse, ovate and acute, or lanceolate and long-acuminate, variously pubescent without, arachnoid-villous within at the apex, ciliate, membranous, scarious, or herbaceous with one, three, or five prominent veins. In some species the lobes are purple-tipped (*S. Hendersoni*). The pubescence of the calyx is probably of more value in specific

differentiation than the length and shape of the lobes, and varies less within the species than the pubescence of other parts of the plant.

*Corolla*.—The prevailing color of the corolla is purple, varying from a deep dark purple to rose-purple (mallow purple), or even rose-pink. The only white-flowered species are probably *Sidalcea candida* and *S. malachroides*, although there are occasionally white-flowered forms in other species. In the type species, *S. diploscypha*, there is a very definite spot at the base of the petal which may vary from deepest purple to a colorless (greenish white) area, in which case it is spoken of as a "ghost" spot.

The unguiculate petals are oblique, obcordate (if deeply notched), or merely truncate. On each side of the claw is a tuft of hairs which, meeting with those from the adjoining claw, forms the so-called "weel" (pl. 5, figs. 1 and 2). The apex may be entire, minutely denticulate, erose, retuse, emarginate, or deeply and broadly notched as in *S. malachroides*. The petals are not of special specific value because of the gynodimorphism in the plants.

*Stamens*.—The staminal column is double (pl. 5, figs. 3 and 5), a character which delimits definitely this genus from all other malvaceous genera. The filaments are united into two series of phalanges, an outer and an inner. The outer series may separate from the column about the middle, at or near the summit. In the annuals there are five outer phalanges, arising near the middle of the column, which are broad, petaloid, convolute, antipetalous, and about five-antheriferous. This type of phalanx is best exemplified by the type species, *S. diploscypha* (pl. 5, fig. 4) and its nearest relative, *S. hirsuta*. In all, the inner series consists of ten linear, antisepalous, and diantheriferous phalanges. In the perennials (pl. 5, fig. 5) the outer phalanges are narrow, bi- or trifold, with the lobes diantheriferous, and arise near the summit of the column. The subgenus *Malvastralea* has a staminal column (pl. 5, fig. 6) which is not conspicuously double; the outer series of stamens being combined merely at the base into threes or fours. In the subgenus *Hesperalea* (pl. 5, fig. 8) the stamens are few, small, apparently distinct, but usually the outer phalanges are bi- or trifold and occur at the summit of the



column. The anthers are reniform, one-celled by the confluence of their lobes at the apex, and dehisce transversely around the convex side, thereby becoming two-valved. The pollen is globose, spinescent, and extremely large, except in the subgenus *Hesperalcea*.

*Pistil*.—The pistil is composed of five to nine uni-ovulate carpels united about a central axis, with a corresponding number of styles united below. The free portions or branches of the styles are filiform and stigmatose the entire length of their inner face, and much exserted in the pistillate flowers.

*Fruit*.—The fruit (pl. 6) consists of five to nine membranous, reniform, apiculate carpels. This apiculation rarely persists in the mature fruit and may or may not be pubescent. The young carpel is apparently smooth (not wrinkled), and usually pubescent. As it matures the outer dorsal or dorso-lateral wall becomes variously favose, rugulose or reticulate, and if the transverse reticulations disappear the result is a sulcate or furrowed condition as in *Sidalcea calycosa*. The lateral wall has longer markings following very closely the nervation. The carpel is very rarely pubescent at maturity as in *S. hirsuta*. This smoothness or glabrosity of the immature carpel has been extensively used in previous descriptions of species; but, as the markings do not ordinarily appear until late in anthesis, this character becomes of little diagnostic value except in the case of mature fruit. The wrinkling may be augmented by drying. Throughout this study the antithetical terms "smooth and wrinkled," as well as "glabrous and pubescent," have been used to describe the carpellary condition. Although of value as a specific character in the genus, the carpel is of greater importance in indicating the natural grouping of species, as there is much individual variation in the form and degree of the markings. The seeds are of no diagnostic value.

#### GENERIC RELATIONSHIPS

The genus *Sidalcea* is placed in the tribe Malveae of the Malvaceae because of the definite and persistent central axis from which the carpels separate at maturity and because the staminal column is antheriferous at the summit. It belongs in



the subtribe Eumalveae because of the filiform style-branches which are longitudinally stigmatose on the inner face.

*Sidalcea* is distinguished from *Sida* (to which certain species had formerly been referred on account of the lack of bracteoles) by the ascending cotyledons and descending radicle, as well as by the longitudinally stigmatose style-branches; from *Malva* and *Althaea* by the lack of bracteoles and fewer carpels; from *Malvastrum* by the style-branches and the habit; from *Sphaeralcea* by the uni-ovulate carpels; from *Callirhoe* by the soft, evanescent apiculation of the carpel; and from all the genera of the family by the separation of the stamens from the staminal column in two series, an outer and an inner, with the filaments combined into definite sets or phalanges. The staminal phalanges are best exemplified by the annual species, *Sidalcea diploscypha* and *S. hirsuta*, and are least evident in *S. malachroides* (pl. 5, figs. 4, 5, 6, and 8).

#### SPECIFIC VARIATIONS, RELATIONSHIPS, AND GENERAL DISTRIBUTION

The genus *Sidalcea* constitutes a group of plants inhabiting western North America from the Rocky Mountains in Colorado to the Pacific Coast, and from British Columbia south to the states of Lower California, Durango, Coahuila, and Nuevo Leon, in Mexico. The center of distribution for the genus is in the region of Eldorado County, California; more than half the species are indigenous to California and many are common to that state and one or more neighboring states (fig. 1).

As mesophytes, they are generally found growing along mountain streams, in moist meadows, along roadsides, about springs, in brackish or subalkaline marshes, and in the fog belt of coastal counties. If found in arid regions, they grow in moist but soon desiccated soil.

A discussion of the phylogeny of so variable a group is always more or less hypothetical, yet there are several criteria that may be used as probable evidence of certain tendencies, especially in connection with geographical distribution.

As to the probable origin of the group, it may be inferred that at the close of the Ice Age the genus migrated northward from

the Mexican plateau along two paths, the one following the

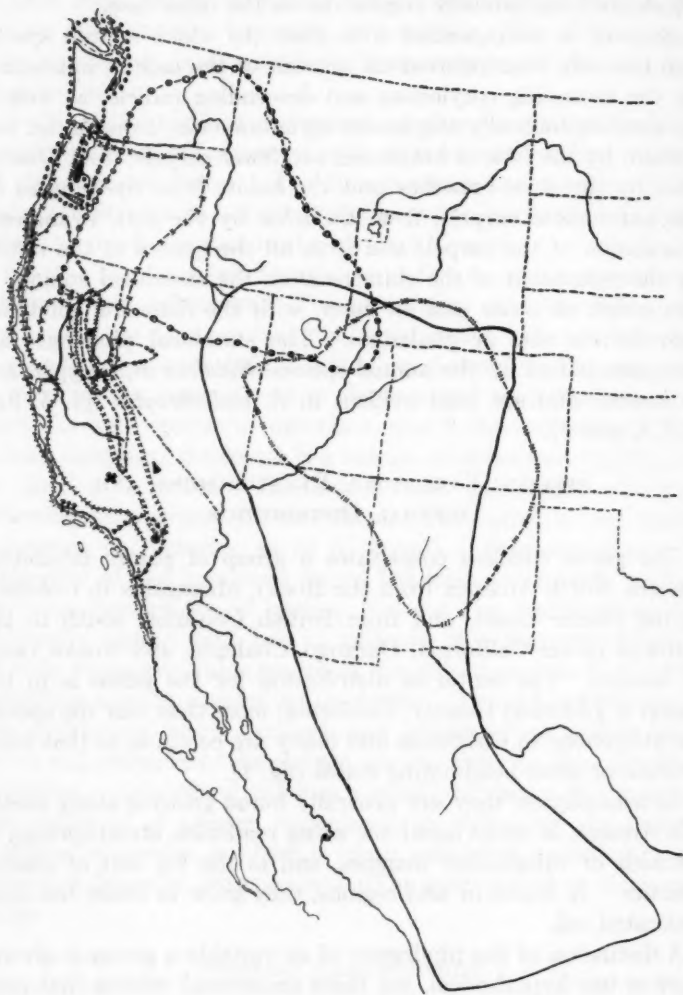


FIG. 1.

Rocky Mountains and the other traversing California. A discussion of these routes involves a consideration of the three

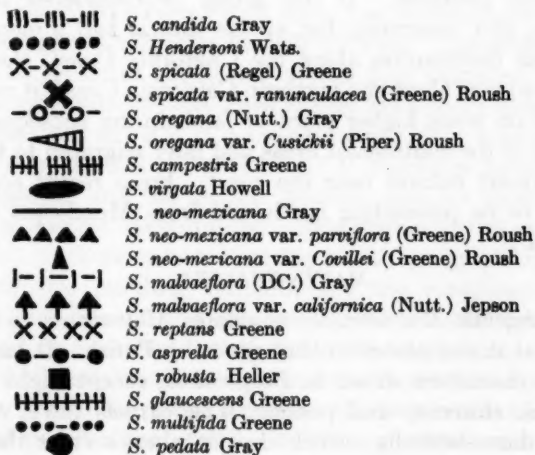
natural groups into which the genus readily falls, namely, the subgenera *Eusidalcea* (sections *Annuae* and *Perennes*), *Malvastralcea*, and *Hesperalcea*.

These groups doubtless had a common ancestor, which in some characters resembled the shrubby malvastrums of the subtropics, in others the more tree-like forms of genera not so closely related to the present *Sidalcea*. If certain characters common to the group as a whole be disregarded, then the characters used in this study as indicative of primitive and advanced conditions may be tabulated as follows:

PRIMITIVE	INTERMEDIATE	ADVANCED
Suffrutescent	Herbaceous stem, ligneous at base	Herbaceous
Perennial	Perennial	Annual
Strong woody root	Root variously thickened	Slight tap-root
Much-branched stem	Branched or unbranched stem	Slightly branched stem
Branches leafy	Intermediate but chiefly floral	Branches chiefly floral
Slightly lobed leaves	Leaves variously lobed or cleft	Deeply palmately parted leaves

Figure 1.

Map of western North America showing general distribution of the subgenus *Eusidalcea*, section *Perennes*.



PRIMITITE	INTERMEDIATE	ADVANCED
Stamens apparently separate at summit of column	Outer staminal phalanges evident, narrow, deeply cleft	Outer staminal phalanges broad, petaloid, near middle of column
Small pollen	Intermediate	Large pollen
Smooth carpels	Carpels smooth to variously reticulate	Wrinkled carpels
Small carpels	Intermediate	Large carpels
Small embryo	Intermediate	Large embryo

Characters common to the subgenera as a whole and not considered in the tabulation are the prevailing gynodioecism and gynodimorphism, a generally accrescent calyx, and a spiciform or racemose inflorescence.

#### HESPERALCEA

The subgenus *Hesperalcea* with its one species, *S. malachroides*, may be considered the most primitive of the genus because it is a suffruticose, leafy branched perennial with a strong woody root and only slightly lobed leaves. The carpels are small and smooth, with a small embryo. The stamens are apparently separate at the summit of the column but in reality they are united into twos or threes in the outer series, and the pollen is very small. This is more nearly like the condition seen in *Adansonia* of the closely related Bombacaceae although habitally it most resembles *Malvastrum spicatum*. If this group be considered the most primitive, and, assuming that at one time it had a more or less continuous distribution along the California Coast, then, since it is now so rare along the northern California Coast, it may have remained on some higher point of land during subsequent submergence of the continental areas and later migrated to the more suitable moist habitat near the coast. From recent collections it seems to be proceeding northward from Mendocino County, California.

#### MALVASTRALCEA

The subgenus *Malvastralcea* simulates *Malvastrum* to such an extent that it was placed in that genus by Parish. It has all the primitive characters shown in *Hesperalcea*, except slight changes in carpels, stamens, and pollen. The carpels have very few wrinkles dorso-laterally, which do not always cross the dorsal

midnerve. The outer stamineal phalanges are more prominently cleft and merely united at the base into threes or fours. The pollen is larger. The species *Sidalcea Hickmani* was not found for many years outside of the Salinas Valley, California, then another collection was made at Tassajara Hot Springs not far distant, and much more recently a slightly modified form was collected in Marin County by Miss Alice Eastwood. *Sidalcea Hickmani* var. *Parishii* has been reported only from the west slopes of the San Bernardino Mountains, which indicates a most discontinuous distribution for this subgenus. Thus it may be surmised that this group had an almost parallel development with *Hesperalcea*, and is only a slightly more recent branch from the parent stock.

#### EUSIDALCEA

*Perennes*.—In the subgenus *Eusidalcea* the section *Perennes* shows the most divergent paths of migration, the one along the Rocky Mountains, the other through California. The two species *Sidalcea neo-mexicana* and *S. candida* occur along streams or in wet mountain meadows from Mexico to Wyoming and Idaho. Although of wider range than any others within the genus they are well defined with less variation individually and specifically than the California species. This may be due to the fact that the Rocky Mountains are older geologically than the California area, and thus it may be inferred that these two species have become more thoroughly established in their habitat. The great degree of variation exhibited in those *Perennes* that migrated through California may indicate that these species are a much more recent development and are still in a nascent state. The species of the section *Perennes* show all gradations of character between the other subgenera and the section *Annuae*, and are consequently difficult of specific delimitation. This variability is especially pronounced in those species covering a wide geographical range. Because of this puzzling variation and the conspicuous polymorphism and because the characters most affected are vegetative, it may be conceded that the response to so varied a topography and climatic conditions may account for the segregation of certain groups as rather large specific units with almost infinite local peculiarities, and the isolation of other much smaller

groups to very restricted areas. The *Perennes* constitute the intermediate group. The intermediate characters are: herbaceous perennials often becoming ligneous at the base of the stem, a variable root system, leaves variously lobed and parted even on the same individual, carpels which may be smooth, dorso-laterally reticulated (i. e., only on the angle), or entirely reticulate with short, close, fine meshes, and staminal phalanges evident but very narrow, deeply bifid, and diantheriferous, and large pollen.

The path of migration of the *Perennes* in California was probably along the Sierra Nevada Mountains, and, not being boreal plants, they remained in the foothills and lower altitudes, very seldom above 5,000 feet. The greater number of species and individuals occur in those counties bordering Lake Tahoe on the west (particularly in Eldorado County). From the 3,000 herbarium sheets examined indications point to this area as being the probable center of distribution for the subgenus *Eusidalcea*.

It has not been possible to trace a direct lineal sequence through the *Perennes*, but certain species show relationships among themselves and to other groups that may be considered, and are illustrated on the accompanying hypothetical diagram (fig. 2). Specific segregation is, no doubt, due to a response to the environmental conditions of an extremely variable topography and climate, with consequent isolation along the route, or at the outermost limits of the area covered by the genus as a whole.

*Sidalcea pedata*, in all other characters similar to the perennials of *Eusidalcea*, has a staminal column like that of the subgenus *Malvastracea*, and may therefore be considered the connecting form between these two subgenera. This distinct species and *S. Hickmani* var. *Parishii* occur in neighboring regions. The scapiform habit and pedately parted leaves of *S. pedata* relate it to *S. multifida* of the foothills near Reno, Nevada, but the pubescence and inflorescence are totally different. It is not easy to separate the more erect forms of *S. glaucescens* in that region from *S. multifida*, but the restricted geographical range of the latter may be of assistance. *Sidalcea robusta*, while more closely related to *S. asprella* in its glaucous character and large showy



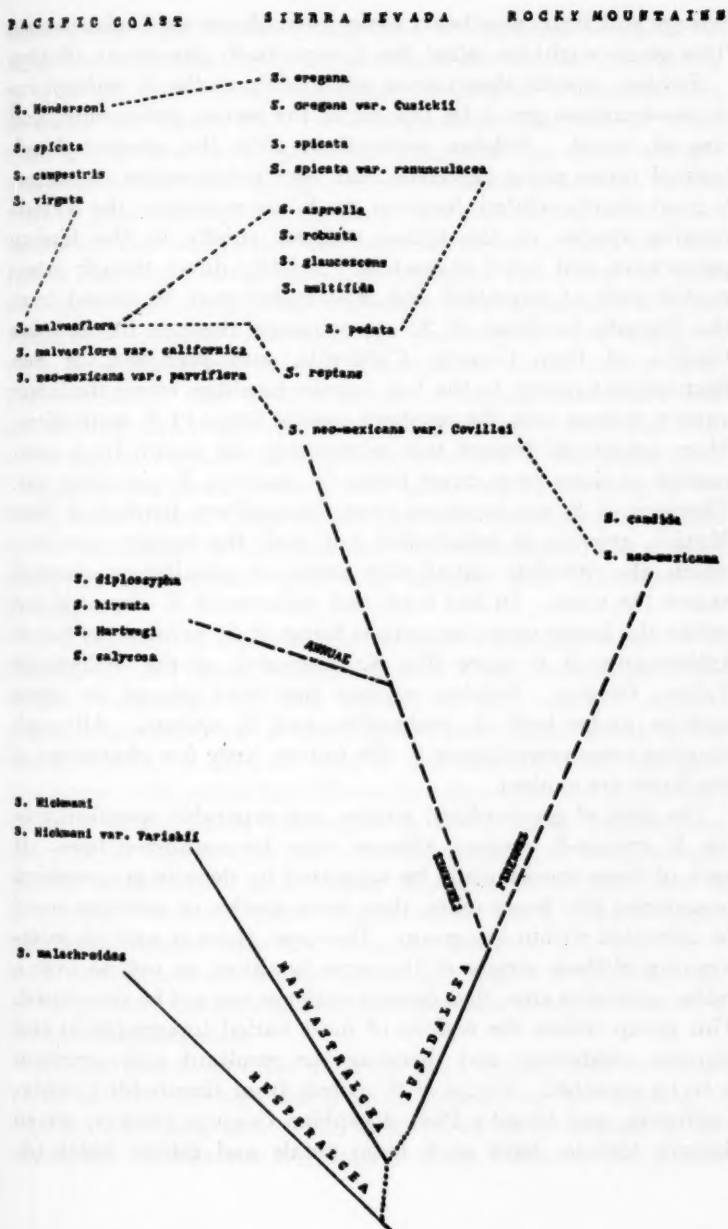


Figure 2. Chart showing probable relationships in connection with the general distribution within the genus *Sidalcea*.

Subgenera ———, Sections: Perennes — — — ; Annuae — — —

Grouping of species indicates apparent relationships. The dotted lines indicate probable relationships between natural groups.

flowers and fruit, also bears some resemblance to *S. glaucescens*. This group might be called the *S. asprella*-*S. glaucescens* affinity.

*Sidalcea asprella* shows some relationship to the *S. malvaeflora*-*S. neo-mexicana* group by the cut of the leaves, pubescence, and size of carpel. *Sidalcea malvaeflora*, with the greatest longitudinal range along the coast and very polymorphic character, is most closely related, however, to *S. neo-mexicana*, the widest-ranging species of the inland regions, chiefly in the hirsute pubescence and calyx characters. A fairly direct though interrupted path of migration and relationship may be traced from the Nevada localities of *S. neo-mexicana* through its varieties *Covillei*, of Inyo County, California, and *parviflora*, of San Bernardino County, to the Los Angeles localities where the latter variety merges with the southern coastal forms of *S. malvaeflora*. More tendencies toward this relationship are shown by a comparison of those very dwarf forms (*S. confinis*, *S. parviflora* var. *Thurberi*) of *S. neo-mexicana* from the southern borders of New Mexico, growing in subalkaline soil, with the variety *parviflora* which also inhabits subalkaline areas or subalkaline marshes nearer the coast. In leaf form and pubescence *S. virgata* is not unlike the larger more decumbent forms of *S. malvaeflora*, but in inflorescence it is more like *S. campestris* of the Willamette Valley, Oregon. *Sidalcea reptans* has been placed by some authors under both *S. malvaeflora* and *S. spicata*. Although showing some resemblance to the former, very few characters of the latter are evident.

The idea of geographical strains, not separable specifically in the *S. spicata*-*S. oregana* alliance, may be considered here. If each of these species could be separated by definite geographical boundaries into lesser units, then more species or varieties could be delimited within the group. However, there is such an interweaving of these strains in the same localities, as well as over a rather extensive area, that tenable varieties can not be recognized. This group covers the regions of most varied topographical and climatic conditions, and therefore the resultant polymorphism is to be expected. Forms of *S. spicata* from Humboldt County, California, and Grant's Pass, Josephine County, Oregon, are so densely hirsute, have such large petals and robust habit (*S.*

*eximia*, type), and are so unlike some of the forms of the mountains of southeastern and middle Oregon as to be very confusing. If it be accepted that in the region covered by *S. spicata* there develops one strain with more hirsuteness and another strain with sparse or no hirsuteness but a more or less dense stellate-pubescent and that all gradations between these two strains may be found throughout the range and even on the same plant, rendering the recognition of varieties impracticable, the confusion resulting from attempts to segregate and name the great number of minutely different variants may be simplified. Certain characters, however, are relatively constant for this species: a more or less densely spicate inflorescence (small calyx, short pedicels) which may have a hirsute or stellate pubescence predominating, and long hirsute hairs on the lower part of the stem, or occasionally a more equal hirsute condition of the entire plant.

*Sidalcea campestris*, with a very restricted distribution in the Willamette Valley, Oregon, and generally resembling *S. spicata* in the hirsuteness of the stem and the inflorescence, has a much more lax inflorescence with long pedicels and lighter-colored flowers.

It is difficult to separate the northern California forms of *S. oregana* and the Sierra Nevada forms of *S. spicata* because of the stellate pubescence of both species in this region. *Sidalcea oregana*, however, has a harsh puberulence (glabrescent in the eastern forms), a different type of inflorescence, more elongate, less dense, with somewhat differently colored flowers, and a very different calyx which culminates in the peculiar campanulate calyx of its variety *Cusickii*. To the writer it is inconceivable that *S. campestris* is more closely related to *S. oregana* than to *S. spicata*. Those eastern Oregon forms which have a sparse hirsuteness mixed with the stellate pubescence may be due to some condition of the habitat rather than results of hybridization, although no experimental evidence has been brought forward to prove this assumption.

*Sidalcea Hendersoni*, the most northern species, may be related to *S. candida* through the lack of pubescence and smooth or smoothish carpels, and to the large forms of *S. oregana* in leaf character. In distance from the probable center of distribution

it might be considered a recent species; on the other hand, its more primitive characters and its relation to *S. candida* may indicate that it is an offshoot from the Rocky Mountain species, having gone far beyond them to a more northern and a moist habitat.

*Annuae*.—The section *Annuae*, with all the advanced characters above tabulated well developed, may be considered as a very recent offshoot from the section *Perennes*, and the plants have become adapted to the short season of rain and growth in the regions bordering the Sacramento and San Joaquin Valleys, California (fig. 3), and thus have developed the annual habit. Those plants nearer the coast are tending to become perennial by the development of roots along the base of the decumbent stem. The fact that they are gradually extending their range north, south, and west, may be only another evidence that the center of distribution for *Eusidalcea*, as given above, is in the region of Eldorado County, California. The *Annuae*, although closely related among themselves, are very distinct specifically in the carpellary characters but less so in vegetative ones, a condition just the reverse of that found in the more polymorphic and more widely distributed *Perennes*.

*Sidalcea Hartwegi*, which in all other respects is like the other annuals, has the outer staminal phalanges of the perennials of *Eusidalcea* and is thus considered a transition form between the *Annuae* and *Perennes*.

The theory of hybridization has been advanced as a possible cause of the polymorphism and marked variability within this genus. However, the author at present has no direct evidence to advance in support of this theory. The variations exhibited seem to be the result of climatic, topographical, and geographical conditions. Shade and moisture seem to favor the development of thin leaves, fewer hairs or more simple hairs, and more luxuriant vegetative growth; exposure and little moisture or more arid conditions produce a tendency toward short, more-branched hairs (harsh puberulence in some), and more and deeply parted leaves; sub-alkaline or subsaline habitats result in reduced, thicker leaves with glaucous or glabrescent surfaces.

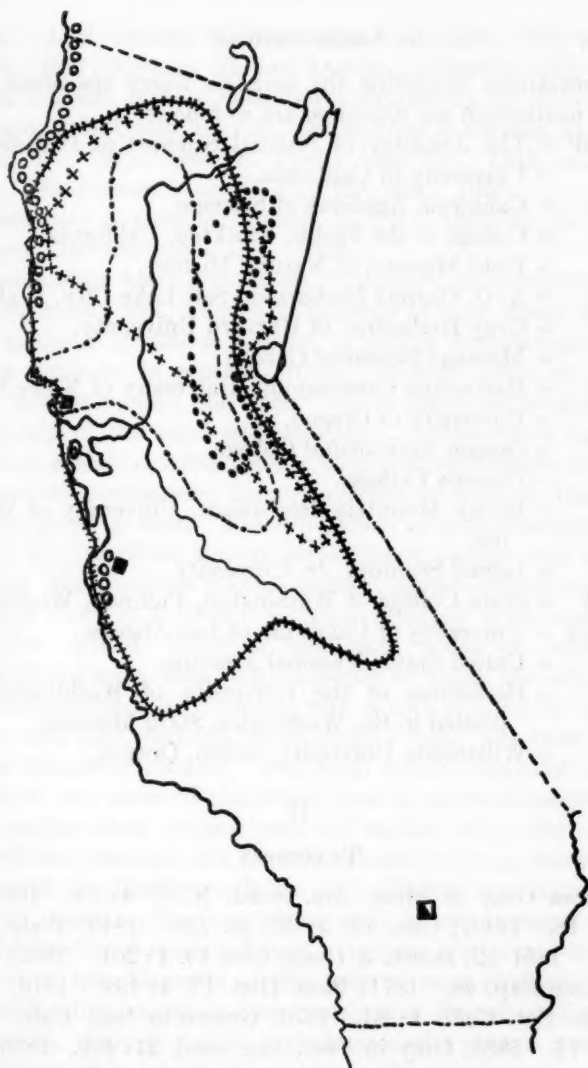


Fig. 3. Map of California, showing distribution of *Sidalcea*.

Subgenus *Eusidalcea*, section *Annuae*:

- *S. diploscypha* (Torr. & Gray) Gray  
 ●●●● *S. hirsuta* Gray  
 - - - *S. calycosa* Jones  
 +++ *S. Hartwegi* Gray

Subgenus *Malvastrulcea*:

- *S. Hickmani* Greene  
 ■ *S. Hickmani* var. *Parishii* Rob.

Subgenus *Hesperalcea*:

- *S. malachroides* (H. & A.) Gray

## ABBREVIATIONS

Abbreviations indicating the herbaria where specimens cited in this monograph are deposited are as follows:

- ANSP = The Academy of Natural Sciences of Philadelphia.  
C = University of California.  
CAS = California Academy of Sciences.  
CP = College of the Pacific, Stockton, California.  
F = Field Museum of Natural History.  
Gar. = A. O. Garrett Herbarium, Salt Lake City, Utah.  
G = Gray Herbarium of Harvard University.  
M = Missouri Botanical Garden.  
ND = Herbarium Greeneanum, University of Notre Dame.  
O = University of Oregon.  
OAC = Oregon Agricultural College.  
P = Pomona College.  
RM = Rocky Mountain Herbarium, University of Wyoming.  
S = Leland Stanford, Jr. University.  
SCW = State College of Washington, Pullman, Washington.  
UCLA = University of California at Los Angeles.  
US = United States National Museum.  
W = Herbarium of the University of Washington, deposited in the Washington State Museum.  
Wil. = Willamette University, Salem, Oregon.

## II

## TAXONOMY

*Sidalcea* Gray in Mem. Am. Acad. N. S. 4: 18. 1849 (Pl. Fendl. 18. 1849); Gen. Ill. 2: 57. *pl.* 120. 1849; Walp. Ann. 2: 150. 1851-52; Benth. & Hook. Gen. Pl. 1: 201. 1862; Wats. Bot. King Exp. 46. 1871; Baill. Hist. Pl. 4: 139. 1873; Brew. & Wats. Bot. Calif. 1: 83. 1876; Greene in Bull. Calif. Acad. Sci. 1: 74. 1885; Gray in Proc. Am. Acad. 21: 409. 1886; *ibid.* 22: 286. 1887; K. Schumann in Engl. & Prantl, Nat. Pflanzenfam. 3<sup>a</sup>: 41. 1890; Greene, Fl. Francis. 102. 1891; E. G. Baker in Jour. Bot. 29: 51. 1891 (Synopsis Malveae, 29. 1894); Greene, Man. Bay-Region Bot. 65. 1894; Gray, Syn. Fl. N. Am.



1: 302. 1897; Jepson, Fl. West. Mid. Calif. 239. 1901, and ed. 2. 258. 1911; Abrams, Fl. Los Angeles & Vicinity, 247. 1904; Nelson in Coult. & Nels. Man. Bot. Cent. Rocky Mt. 317. 1909; Greene in Cyb. Columb. 1: 33. 1914; Piper & Beattie, Fl. N. W. Coast, 238. 1915; Rydb. Fl. Rocky Mts. 558. 1917, and ed. 2. 558. 1922; Jepson, Man. Fl. Pl. Calif. 628. 1925.

*Hesperalcea* Greene in Pittonia 2: 301. 1892; E. G. Baker, Synopsis Malveae Suppl. 109. 1894.

Erect annual herbs from a slight tap-root, or perennials from a strong woody root, frequently ligneous at base, rarely suffruticose, glabrous, stellate-pubescent, or merely stellate-puberulent. Leaves orbicular in general outline, variously lobed or parted; basal, middle cauline, and upper cauline leaves strikingly different (rarely of the same segmentation). Inflorescence terminal, racemose, spicate or subumbellate, singly or paniculately disposed; bracts ovate, lanceolate, linear, subulate or setulose; bracteoles none or rarely present. Flowers perfect or gynodioecious (with perfect and pistillate flowers on different plants) and gynodimorphic (the pistillate flowers smaller, deeper-colored and with sterile or abortive anthers). Calyx five-parted, often accrescent, the lobes deltoid, ovate or lanceolate, acute or acuminate. Petals dark purple, rose-pink, yellowish or white, obovate, entire or erose, emarginate or retuse, with a tuft of hairs at the base above each claw, forming the so-called "weel," the claw adnate to the staminal column. Staminal column sparsely stellate-hispid, of two series of phalanges (sets of united filaments), the outer antipetalous, arising near the middle or at the summit, either broad, petaloid, and convolute, 5-antheriferous, narrow, and bifid with diantheriferous lobes, or indistinct and stamens apparently separate; the inner series of 10 linear, antisepalous and usually diantheriferous phalanges. Anthers reniform, 1-celled on very short free filaments at the apex of each phalanx, usually yellowish, often purple or blue (rarely pink-tinged); pollen large, spinescent. Carpels 5-9 in a circle around a central receptacle; the filiform style branches as many as the carpels and longitudinally stigmatose on the inner face; ovule one in each carpel, peritropous-ascending, the micropyle inferior. Carpels separating at maturity from the receptacle, which is then marked by as

many obtuse, longitudinal processes as the number of carpels, subreniform, membranous, glabrous or pubescent, smooth or variously favose, reticulate or sulcate, beakless or with a short, soft, deciduous apiculation. Seed reniform; embryo arcuate-incurved, partially surrounding the soft endosperm, cotyledons foliaceous, cordate, conduplicate-infolded, radicle inferior.

Type species: *Sidalcea diploscypha* Gray in Mem. Am. Acad. N. S. 4: 19. 1849 (Pl. Fendl. 19. 1849).

#### KEY TO THE SUBGENERA AND SECTIONS

- Leaves orbicular in outline, variously lobed or parted (the upper cauline leaves cleft almost to the base); staminal column conspicuously double, the outer phalanges broad and petaloid or narrow and bifid.  
 .....Subgenus I. *Eusidalcea*  
 Annuals; outer phalanges broad and petaloid.....Section 1. *Annuae*  
 Perennials; outer phalanges narrow, deeply cleft.....Section 2. *Perennes*  
 Leaves flabelliform (or reniform-orbicular), scarcely or not at all lobed or parted; staminal column not conspicuously double, the outer series of stamens combined merely at the base into threes or fours, approximating the inner at the summit; habitally like *Malvastrum*.....Subgenus II. *Malvastracea*  
 Leaves vitiform; stamens few, the outer series apparently separate only at the very summit of the staminal column.....Subgenus III. *Hesperalcea*

#### SUBGENUS I. EUSIDALCEA Jepson

Subgenus I. *EUSIDALCEA* Jepson, Fl. West. Mid. Calif. 239. 1901, and ed. 2. 258. 1911; Man. Fl. Pl. Calif. 628. 1925.

Annuals or herbaceous perennials, often ligneous at the base; leaves orbicular in outline, variously lobed or parted (the upper cauline leaves cleft almost to the base); bracteoles none; staminal column conspicuously double, the outer phalanges broad and petaloid, about 5-antheriferous, or narrow and bifid, mostly 2-antheriferous. Sections 1 and 2.

#### SECTION 1. ANNUAE Roush

##### 1. ANNUAE Roush, new section.

Annuals from a slight tap-root; mostly spring-flowering; leaves, except the basal ones, almost completely palmately (or pedately) parted; staminal column conspicuously double, the five outer phalanges arising from near the middle of the column, petaloid-ampliate (except species no. 4), convolute in aestivation, mostly oblong and undivided, about 5-antheriferous on very short free

filaments at the truncate summit; the inner terminal phalanges mostly 10, linear and diantheriferous; mature carpels dorsally reticulate, rugulose, or favose with short meshes, or longitudinally striate-grooved; plants of California, the typical section. Sp. 1-4.

#### KEY TO THE SPECIES

- a. Mature carpels dorsally rugose-reticulate, or favose with short meshes.
  - b. Bracts palmately parted into filiform segments; plants tawny-hirsute; inflorescence laxly racemose to subumbellate. . . . . 1. *S. diploscypha*
  - bb. Bracts entire or bifid, lobes narrowly linear.
    - c. Plants more or less densely hirsute; inflorescence densely racemose, many-flowered. . . . . 2. *S. hirsuta*
    - cc. Plants glabrescent, or minutely stellate-puberulent; inflorescence racemose, few-flowered. . . . . 4. *S. Hartwegi*
- aa. Mature carpels dorsally striate-grooved longitudinally, about 7-ribbed . . . . . 3. *S. calycosa*

1. *S. diploscypha* (Torr. & Gray) Gray in Benth. Pl. Hartw. 300. 1848; in Mem. Am. Acad. N. S. 4: 19. 1849 (Pl. Fendl. 19. 1849); Gen. Ill. 2: 58. *pl. 120. f. 1-6.* 1849; Brew. & Wats. Bot. Calif. 1: 84. 1876; Greene in Bull. Calif. Acad. Sci. 1: 79. 1885; Gray in Proc. Am. Acad. 21: 410. 1886; K. Schumann in Engl. & Prantl, Nat. Pflanzenfam. 3<sup>a</sup>: 41. 1890; Greene, Fl. Francis. 103. 1891; E. G. Baker in Jour. Bot. 29: 51. 1891 (Synopsis Malveae, 29. 1894); Greene, Man. Bay-Region Bot. 65. 1894; Gray, Syn. Fl. N. Am. 1<sup>a</sup>: 303. 1897; Jepson, Fl. West. Mid. Calif. 239 1901, and ed. 2. 259. 1911; Jepson, Man. Fl. Pl. Calif. 628. 1925. Pl. 5, fig. 4; pl. 7.

*Sida diploscypha* Torr. & Gray, Fl. N. Am. 1: 234. 1838; and Suppl. 682. 1840; Hook. & Arn. Bot. Beech. Voy. 326. *pl. 76* 1840; Walp. Rep. 1: 316. 1842.

*Sidalcea diploscypha* var. *minor* Gray in Mem. Am. Acad. N. S. 4: 19. 1849 (Pl. Fendl. 19. 1849); Greene in Bull. Calif. Acad. Sci. 1: 80. 1885; Gray in Proc. Am. Acad. 21: 410. 1886; E. G. Baker in Jour. Bot. 29: 51. 1891 (Synopsis Malveae, 30. 1894); Gray, Syn. Fl. N. Am. 1<sup>a</sup>: 303. 1897; Jepson, Fl. West. Mid. Calif. 239. 1901, and ed. 2. 259. 1911.

*S. secundiflora* Greene, Fl. Francis. 103. 1891; Man. Bay-Region Bot. 65. 1894; Gray, Syn. Fl. N. Am. 1<sup>a</sup>: 303. 1897, in footnote; Jepson, Fl. West. Mid. Calif. 239. 1901.

Annual from a slight tap-root; stem erect, 1-7 dm. high,

slender and simple, or stouter and paniculately branched, pilose-hirsute throughout, intermixed with a short stellate pubescence; basal leaves orbicular-cordate, 1-2.5 cm. broad, merely crenate, early deciduous; cauline leaves 2-6 cm. in diameter, more or less deeply parted into 5-7 oblong, 2-3-lobed segments; stipules simple, linear-attenuate, or 2-5-parted into filiform segments; inflorescence few-flowered and laxly racemose, subumbellate, or cymose; rhachis, pedicels, bracts, and calyx densely stellate and pilose-hirsute; bracts conspicuous, up to 2.5 cm. long, palmately parted into 5-7 filiform segments; calyx-lobes lanceolate-subulate, as long as the bracts, the midvein prominent; petals varying in color from deep purple to rose-pink and with or without a conspicuous maculation at the base of the petal (sometimes developing a colorless area called a "ghost spot"); mature carpels depressed, subreniform, dorso-laterally rugulose with a more or less prominent dorsal midnerve.

Distribution: on grassy hillsides, in dry pastures and grain fields in northern middle California and along the coast from Humboldt County south to San Luis Obispo County.

Specimens examined:

CALIFORNIA: SHASTA COUNTY—Oak Run, 21 May 1894, *Baker & Nutting* (C, ND); Oak Run, 21 May 1894, *Nutting* (C); TEHAMA COUNTY—8 miles south of Vina, 29 April 1914, *A. A. Heller 11336* (ANSP, C, G); BUTTE COUNTY—mesa east of Chico, April 1883, *Austin* (ND); Chico, April 1896, *Austin* (M); east of Chico, May 1896, *Austin 139* (ND, US); Chico, May 1897, *Bruce 1921* (P, S); fields, 8 May 1897, *Austin 1921* (G, US); near Clear Creek, 175 ft. alt., 1-15 May 1897, *H. E. Brown 215* (ANSP, C, F, M, S, US); near Chico, 5 May 1902, *Heller & Brown 5452* (ANSP, G, F, M, S, US); 12 miles north of Chico, 29 April 1914, *A. A. Heller 11336* (CAS, F, M, ND, OAC, S, US); YUBA COUNTY—Marysville Buttes, 1893, *Blankinship* (C); PLUMAS COUNTY—1877, *Austin* (F); CALAVERAS COUNTY—near Milton, 18-30 May 1895, *Davy 1330* (C, G); MARIPOSA COUNTY—summer of 1880, *Hollick* (US); INYO COUNTY—Round Valley, June 1925, *Mrs. G. E. Kelly* (CAS); COLUSA COUNTY—Mountain House, *K. Brandegee* (C); near College City, 1905, *King* (C, P); Indian Rancherio, Stony Ford, 1923, *Merriam* (CAS); YOLO COUNTY—Capay Valley,

30 May 1893, *Blankinship* (C, G); near Madison, 29 April 1902, *Heller & Brown 5412* (ANSP, F, G, M, S, US); near Madison, 29 April 1902, *Heller & Brown 5414* (F, G, M, P, S, US); Rumsey, 7 May 1903, *C. F. Baker 2931* (C, G, M, ND, P, US); LAKE COUNTY—1884, *Curran* (G); Lakeport, June 1885, *K. Brandegee* (C); Lower Lake, May 1902, *Bowman 55* (S); near Lakeport, 1400 ft. alt., 12 May 1921, *Tracy 5539* (C); Kelseyville, 14 April 1923, *Blankinship* (CAS); near Lakeport, 19 May 1923, *M. S. Baker 2537* (S); NAPA COUNTY—Calistoga, 1888, *Parry* (M); 3-4 miles east of Angwin's, 1200 ft. alt., 21 May 1902, *Tracy 1576* (C); St. Helena, 1 April 1921, *Hunt* (CAS); Napa, 24 April 1924, *M. E. Jones* (P); SOLANO COUNTY—English Hills, 2-6 May 1891, *Jepson* (C); Vaca Mts., May 1892, *Jepson* (C); Montezuma Hills, 14 May 1892, *Jepson* (C, US); SACRAMENTO COUNTY—Elk Grove, May 1882, *Drew* (C); SAN JOAQUIN COUNTY—Stockton, 1890-91, *J. A. Sanford 349* (C); Hood's Peak, June 1893, *Michener & Bioletti* (C); CONTRA COSTA COUNTY—Pacheco Valley, May 1882, *Rattan* (S); 1884, *Curran* (S); Walnut Creek, May 1903, *Elmer 4316* (CAS, OAC, P, S); Concord, July 1903, *Elmer 4316* (M); ALAMEDA COUNTY—Newark, 6 May 1895, *Davy 1121* (C); SANTA CLARA COUNTY—4 miles south of San Jose, 1 May 1887, *Rattan* (S); between Saratoga Springs and the Village, 11 May 1888, *Leeds* (F); Mt. Hamilton, 9 June 1890, *Price* (C); Stanford University, 21 April 1895, *Rutter 123* (US); high hill, Stanford University, 16 May 1896, *Dudley* (S); between Smith Creek and Lick Observatory, 3000 ft. alt., 31 May 1907, *R. L. Pendleton 912* (C, P); 2 mi. from Gilroy, 6 May 1922, *Ferris* (S); Isabel Creek, Mt. Hamilton, 19 May 1923, *Ferris 4148* (P, S); near Coyote, 100 ft. alt., 17 May 1918, *Ferris 842* (S); HUMBOLDT COUNTY—1888, *Marshall* (C); near Elk Prairie, 11 June 1899, *Davy & Blasdale 5463* (C); Fort Seward, 400 ft. alt., 14 May 1914, *Tracy 4466* (C, US); MENDOCINO COUNTY—Ukiah, 6 May 1868, *Kellogg & Harford 111* (CAS, M, US); near Cahto, 18 June 1890, *K. Brandegee* (C); Snow Mountain, 22 June 1892, *K. Brandegee* (C); 30 June 1893, *Blankinship* (G); Potter Valley, 1600 ft. alt., April-May 1894, *Purpus 109* (1090 or 1091) (C); Potter Valley, April 1897, *Purpus 4056* (C); near Walkers Mt., 24 May 1899, *Blasdale 1022* (C); Sherwood Valley, 17 June 1899, *Dudley* (S);



near Yorkville, June 1901, *Carruth* (CAS); near Handley's, May 1903, *McMurphy* 160 (S, US); Willits, June 1906, *Clark* (CAS); near Comptche, 23-29 June 1906, *H. A. Walker* 312 (C); 1 mile north of Blue Rock, 28 July 1909, *McMurphy* 836 (S); Ukiah, 13 June 1913, *Eastwood* 3319 (CAS); near Ukiah, 30 April 1918, *Abrams* 6981 (S); Willits, 21 May 1921, *Piper* (CAS); Potter Valley, 19 May 1925, *Eastwood* 12713 (CAS); 15 miles n. of Ukiah, 18 June 1925, *Munz* 9866 (P); along Eel River, near Hearst, 1600 ft. alt., 29 May 1927, *Bacigalupi* 1558 (S); near Covelo, 5 June 1928, *Eastwood* 15225 (CAS); SONOMA COUNTY—Petaluma, 10 April 1880, *Congdon* (S); 1892, *Bioletti* (C, F); Glen Ellen, 7 May 1898, *M. S. Baker* (C); between Santa Rosa and Sebastopol, 8 June 1905, *K. Brandegee* (C); Skaggs Springs, 3 June 1915, *Hawver* (CAS); *Samuels* 29 (US); near Cloverdale, 20 April, *M. S. Baker* (S); MARIN COUNTY—Fairfax, May 1918, *Campbell* (CAS); San Rafael, 1 June 1920, *Jackson* (CAS); near Fairfax, 2 June 1929, *Sutcliffe* (CAS); SAN MATEO COUNTY—woodside, Serpentine, Santa Cruz Peninsula, 17 April 1900, *Dutton* (S); west of Redwood City, 19 May 1906, *Dudley* (S, US); Serpentine back of Redwood City, 1 June 1920, *Abrams* 7498 (S); SAN LUIS OBISPO COUNTY—near Morro, 22 May 1899, *J. H. Barber* (C); Morrow Bay, 10 May 1928, *Eastwood* 15161 (CAS); near Cambrio, 18 May 1928, *Eastwood* 15158 (CAS); WITHOUT LOCALITY—*Hartweg* 1668 (G); 1846, *Fremont's Expedition* 432 (G TYPE of *S. diploscypha* var. *minor* Gray, M, US); 1833, *Douglas* (G TYPE); 1853-54, *Bigelow* (ANSP, US); 1866, *Bolander* 4813 (C, G, US); May 1884, Putah Canyon, *Jepson* (C); hilltops, 29 April 1900, *Atkinson* (S); Petrified Forest, 5 June 1915, *Eastwood* 4586 (CAS); Dashielle, Mt. Sanhedrin, 22 May 1925, *Eastwood* 12794 (CAS).

The difference in size of the types of *S. diploscypha* and its variety *minor*, in addition to the presence or absence of the maculation at the base of the petals, indicates why Dr. Gray so designated them. Examination of an abundance of more recently collected specimens proves definitely that in the absence of the dark purple spot a similar well-defined colorless area known as a "ghost" spot is developed (well shown in *Eastwood* No. 12713), so that in general in fresh material either the dark purple or the "ghost" spot is plainly visible. In specimens



collected by K. Brandegee between Santa Rosa and Sebastopol, 8 June 1905, there are all gradations from the darkest purple to the colorless area. The same is true for *Austin No. 139* and *Bruce No. 1921*. The matter of size as a varietal distinction does not hold, as is shown by the fact that the specimens cited, as well as many others which have the maculation, are much larger than Gray's type of the species.

Specimens which may be considered authentic for Greene's *S. secundiflora* are very slender unbranched forms with few flowers which are more laxly racemose than some of the more robust branching forms. The inflorescence can scarcely be called "secund" in any of these plants, as all gradations from the laxly racemose to the cymose or even the subumbellate condition are present throughout the group. Variation in the degree of hirsuteness in the species has led to the confusion of those less hirsute with *S. Hartwegi*, but the presence of the palmately parted "spider-like" filiform bracts, as well as the less rugose carpels, makes *S. diploscypha* definitely distinct.

This is a strikingly beautiful species which, as a cultivated plant, even though an annual, should rival some species of *Lavatera* and *Malva*.

2. *S. hirsuta* Gray in Smiths. Contr. 3: 16. 1852 (Pl. Wright. 1: 16. 1852); Torr. in Pacif. R. R. Rept. 4: 72. 1857; Walp. Ann. 4: 309. 1857; Gray in Proc. Am. Acad. 21: 410. 1886; Greene, Fl. Francis. 103. 1891; E. G. Baker in Jour. Bot. 29: 51. 1891 (Synopsis Malveae, 29. 1894); Greene, Man. Bay-Region Bot. 65. 1894; Gray, Syn. Fl. N. Am. 1<sup>1</sup>: 303. 1897; Jepson, Man. Fl. Pl. Calif. 629. 1925. Pl. 6, fig. 1.

*S. delphinifolia* Gray in Benth. Pl. Hartw. 300. 1848, not *Sida delphinifolia* Nutt.; in Mem. Am. Acad. N. S. 4: 19. 1849 (Pl. Fendl. 19. 1849); Gen. Ill. 2: 58, pl. 120, f. 10-12. 1849; Walp. Ann. 2: 151. 1851-52, as to name only.

*S. Hartwegi* Brew. & Wats. Bot. Calif. 1: 84. 1876, as to description and synonymy; Greene in Bull. Calif. Acad. Sci. 1: 78. 1885.

Annual from a tap-root with strong lateral roots; stem erect, stout, 1-8 dm. high, strict or with erect branches, usually glabrous

below, soft-hirsute above; basal leaves round-cordate, small, crenately lobed, early deciduous; cauline leaves 3-8 cm. broad, almost completely palmately parted into 7-9 narrowly linear and entire acute segments, the younger hirsute on the lower surface and the petiole, the older glabrous except on the veins beneath; stipules purplish, lanceolate-attenuate or subulate, 3-12 mm. long, ciliate; inflorescence up to 20 cm. long, densely spicate, leafy at base, rhachis and pedicels tawny-hirsute; bracts often purplish, linear, bifid; calyx densely tawny-hirsute intermixed with a close stellate tomentum, deeply lobed, the lobes triangular-lanceolate, long-acuminate, ciliate; petals rose-purple, emarginate and erose, 15-25 mm. long; mature carpels large, favose-reticulate or deeply favose-areolate, more or less stellate-pubescent.

Distribution: in low and wet but soon desiccated ground in the valleys of the Sacramento and Stanislaus Rivers from Butte County to Merced County, California.

Specimens examined:

CALIFORNIA: BUTTE COUNTY—Chico, wheat fields, 27 April 1885, *Gray* (G); Rancho Chico, May 1878, *Bidwell* (G); Chico, 1887, *Parry* (M); plains east of Chico, April 1896, *Bruce* 193 (US); plains east of Chico, July 1896, *Bruce* 693 (M); plains along sloughs, April 1897, *Bruce* 1924 (P); fields near Chico, May 1897, *Austin* 1924 (US); near Biggs, 15 May 1902, *Heller & Brown* 5557 (ANSP, F, C, P, M, S, US); Table Mountain, Olive Ranch north of Oroville, 23 May 1912, *A. A. Heller* 10751 in part (S, US); Chico-Centerville road, 3 miles from Chico, 16 May 1915, *A. A. Heller* 11871 (ANSP, CAS, F, G, M, OAC, S, US); along highway, 9 miles north of Chico, 8 May 1926, *A. A. Heller* 13937 (US); 10 miles north of Chico, 3 May 1927, *A. A. Heller* 14362 (ANSP); ELDORADO COUNTY—1866, *Rattan* (S); CALAVERAS COUNTY—road near Jenny Lind, 500 ft. alt., 12 May 1928, *Stanford* 971 (CP); between Valley Springs and Wallace, 1 May 1923, *Steinbeck* (CAS); STANISLAUS COUNTY—Knights Ferry, 7 May 1853-4, *Bigelow* (G, US); MERCED COUNTY—Merced, 23 April 1915, *Eastwood* 4392 (CAS, US); WITHOUT LOCALITY—1868-9, *Kellogg & Harford* 110 in part (G); *Hartweg* 1667 (G TYPE); 1838-42, *McCombs* Exp., *Newberry* (US).

Dr. Gray<sup>13</sup> in the original treatment of the genus *Sidalcea* described the Hartweg collection (No. 1667) as *Sidalcea delphinifolia* and erroneously interpreted this species as being conspecific with the *Sida delphinifolia* Nutt. which is *Sidalcea malvaeflora*. He later recognized this case of mistaken identity and renamed the *Sidalcea delphinifolia*, designating it as *S. hirsuta*. Dr. Greene later took up the name of *S. delphinifolia*, applying it to the true *S. malvaeflora* of the coastal region which is the same as the *Sida delphinifolia* of Nuttall.

The species is worthy of cultivation because of the long raceme of very large rose-purple flowers, as contrasted with the tawny hirsuteness of the vegetative parts and the calyx.

3. *S. calycosa* Jones in Am. Nat. 17: 875. 1883 (here published as *Sidalcia*); Gray in Proc. Am. Acad. 21: 410. 1886; *ibid.* 22: 286. 1887; Greene, Fl. Francis. 104. 1891; E. G. Baker in Jour. Bot. 29: 51. 1891 (Synopsis Malveae, 29. 1894); Greene, Man. Bay-Region Bot. 65. 1894; Gray, Syn. Fl. N. Am. 1<sup>1</sup>: 303. 1897; Jepson, Fl. West. Mid. Calif. 240. 1901, and ed. 2. 259. 1911; Man. Fl. Pl. Calif. 629. 1925.

Pl. 6, figs. 3 and 4.

*S. sulcata* Curran acc. to Greene in Bull. Calif. Acad. Sci. 1: 79. 1885; Gray, Syn. Fl. N. Am. 1<sup>1</sup>: 303. 1897; Jepson, Fl. West. Mid. Calif. 240. 1901, and ed. 2. 259. 1911.

*S. rhizomata* Jepson, Man. Fl. Pl. Calif. 629. 1925.

Annual (tending to become perennial by the rhizomatously rooting base); stems simple or much branched, slender or more or less succulent, green or purplish, erect or ascending, up to 7.5 dm. high, the decumbent base often rooting freely, glabrous or sparingly hirsute, especially above; basal leaves orbicular, up to 10 cm. wide, crenate or slightly lobed, petioles up to 3 dm. long; cauline leaves almost completely parted to the base into 5-11 oblanceolate or cuneate segments, the segments entire or dentate at the apex, somewhat hirsute and ciliate; stipules green or purple, lance-ovate or broadly ovate and acuminate, or obtuse and dentate, serrate, ciliate; inflorescence long-peduncled, densely spicate, elongating more or less in anthesis, 3-7 cm. broad;

<sup>13</sup> Gray in Mem. Am. Acad. N. S. 4: 19. 1849 (Pl. Fendl. 19. 1849).

bracts green or purplish, membranous, 2–12 mm. long, 2–15 mm. wide, deeply bifid, the lobes lanceolate, ovate, and acuminate, or obtuse and dentate, about 6 mm. wide, serrate and ciliate with long tawny hairs; calyx more or less tawny-hirsute at base and on the veins as well as finely stellate-pubescent (in interior region forms), the lobes purple-tipped, ovate-acuminate, membranous, serrate, and long-ciliate; petals purple, up to 2.5 cm. long; carpels often purple-tinged, glabrous and strongly striate-grooved dorsally (by obliteration of transverse nervations), and closely reticulate laterally.

Distribution: California, along the coast in wet places, Sonoma County, marshes of the Point Reyes Peninsula, Marin County, in the Great Central Valley, and in the foothills of the Sierra Nevadas from Shasta County to Mariposa County.

Specimens examined:

CALIFORNIA: MENDOCINO COUNTY—inland swamps, Pt. Arena, 11 July 1904, *Congdon* (M); SONOMA COUNTY—Petaluma, May 1880, *Congdon* (C, S); Duncan's Mills, 17 June (18 July) 1882, *M. E. Jones* (CAS, G, M, P TYPE, S, US); Valley Ford, 5 June 1886, *Curran* (OAC); Valley Ford, 5 June 1886, *K. Brandegee* (C); Valley Ford, 15 June 1886, *Curran* (S); June 1887, *Curran* (US); North Falls, Stewart's Canyon, May 1889, *M. S. Baker* (C); Santa Rosa, *K. Brandegee* (C); Stewart's Pt., 3 July 1920, *Abrams 7617* (S); MARIN COUNTY—4 June 1886, *Curran* (ND, S); near Lake Lagunitas, June 1895, *Merrill* (G, US); Pt. Reyes, 18 June 1900, *Jepson 1174* (M COTYPE of *S. rhizomata* Jepson); Point Reyes, 18 June 1900, *Davy 6730* (C); Point Reyes (Post Office), July 1903, *Elmer 4936* (C, CAS, M, P, S, US); Lake Lagunitas, 11 May 1918, *Eastwood* (CAS); San Anselmo Canyon, April 1922, *Sutcliffe* (CAS, P); Pt. Reyes, 13 May 1923, *Eastwood* (CAS); north of Lake Lagunitas, 8 May 1927, *J. T. Howell 2365* (CAS); NAPA COUNTY—near Napa City, April 1896, *Sonne* (F, ND); SACRAMENTO COUNTY—upper road between Fair Oaks and Folsom, 20 April 1918, *Hannibal* (S); near Sacramento, 2 April 1915, *Philips* (S); SAN JOAQUIN COUNTY—near Stockton, April 1923, *Steinbeck* (CAS); SHASTA COUNTY—Welch's, 6 July 1898, *M. S. Baker 493* (C); BUTTE COUNTY—adobe flats or swales, April 1896, *Austin 132* (M); Iron Canyon, May 1896, *Austin 132*

(US); Chico, March 1897, *Bruce 1923* (P); May 1897, *Austin* (US); Little Chico Canyon, 29 June 1905, *Krautter 62* (G); Table Mountain, Olive Ranch, north of Oroville, 23 May 1912, A. A. *Heller 10751* in part (ANSP, C, F, G, M); Clear Creek schoolhouse, in the *Quercus Douglasii* belt, 8 May 1914, A. A. *Heller 11381* (ANSP, C, CAS, G, M, OAC, S, US); 8 miles north of Oroville, 23 March 1914, A. A. *Heller 11225* (ANSP, CAS, G, M, OAC, S, US); ELDORADO COUNTY—May 1884, *Curran* (G, probably authentic material for *S. sulcata* Curran); Simpson's Ranch, Sweetwater Creek, 29 May 1907, *K. Brandegee* (C, P, S, US); AMADOR COUNTY—Ione, 1886, *K. Brandegee* (C); Stoney Creek, 1000 ft. alt., 26 May 1896, *Hansen 1671* (M, ND, P, S, US); CALAVERAS COUNTY—Salt Springs Valley, 19 May 1921, *Tracy 5645* (C); TUOLUMNE COUNTY—Chinese, 330 m. alt., 22 May 1913, *Eggleston 9101* (US); MARIPOSA COUNTY—White Rock, 17 April 1892, *Congdon* (G); below Mormon Bar, 15 June 1902, *Congdon* (S, US); Lewis, 17 April 1892, *Congdon* (S).

*Sidalcea calycosa* and *S. sulcata* have been combined, separated, then recombined in a most bewildering manner. *Sidalcea rhizomata* is a more recent segregate from this group. However, from the large number of specimens examined, it is shown that these three "species" are essentially the same in leaves, bracts, pubescence, inflorescence, and fruit. They are also similar in habit, since some of the most delicately slender specimens from the foothills of the Sierra Nevada exhibit a tendency toward the rhizomatously rooting condition displayed by those nearer the coast, and often show some degree of succulency, especially in the basal leaves. A gradual transition can be traced from the slender and often much branched plants of the dry interior region to those of the moister regions near the coast. This transition seems to be only a matter of degree and involves an increase in the tendency toward succulency, a more congested inflorescence, longer hairs, and larger and more dentate or cleft bracts. Plants collected by M. K. Curran (*K. Brandegee*) at Valley Ford, 5 June 1886, as well as by M. E. Jones (US Herb. No. 11840, cotype of *S. calycosa*) are intermediate between *S. calycosa* of Jones and *S. rhizomata* of Jepson. *Elmer No. 4936* from the Point Reyes post-office is only slightly more succulent



and rhizomatous than *Philips* (S Herb. No. 67026) collection from Sacramento County. *A. A. Heller* No. 11225 from Butte County and *Hansen* No. 1671 from Amador County show a decided tendency toward rooting along the decumbent portion of the stem, with larger floral parts, more congested inflorescence, and thickened leaves.

After critical examination of the characters given above, it was thought best to reduce *S. sulcata* and *S. rhizomata* to synonymy and consider the very succulent plants of the Point Reyes peninsula as only an *ecad* of the subsaline (or saline) marshes. In the future should transplant experiments prove this supposition to be incorrect, then the members of this very characteristic group with the sulcate carpels will again have to be treated as distinct entities.

4. *S. Hartwegi* Gray in Benth. Pl. Hartw. 300. 1848; in Mem. Am. Acad. N. S. 4: 20. 1849 (Pl. Fendl. 20. 1849); Walp. Ann. 2: 151. 1851-52; Brew. & Wats. Bot. Calif. 1: 83. 1876, as to name only; Gray in Proc. Am. Acad. 21: 409. 1886; Greene, Fl. Francis. 103. 1891; E. G. Baker in Jour. Bot. 29: 51. 1891 (Synopsis Malveae, 29. 1894); Gray, Syn. Fl. N. Am. 1: 303. 1897; Jepson, Fl. West. Mid. Calif. 239. 1901, and ed. 2. 259. 1911; Man. Fl. Pl. Calif. 628. 1925. Pl. 6, fig. 2.

*S. tenella* Greene in Bull. Calif. Acad. Sci. 1: 7. 1884; *ibid.* 79. 1885.

*S. Hartwegi* var. *tenella* Gray in Proc. Am. Acad. 22: 286. 1887; E. G. Baker in Jour. Bot. 29: 51. 1891 (Synopsis Malveae, 29. 1894); Gray, Syn. Fl. N. Am. 1: 304. 1897.

Annual from a slight tap-root; stems erect, up to 4 dm. high, slender, simple, and strict, or slightly to much branched, glabrescent or minutely stellate-pubescent; leaves palmately or pedately 5-7-parted into linear, entire or 2-3-lobed segments, up to 6 cm. broad, sparsely short-stellate on the lower surface, almost glabrous on the upper surface; basal leaves merely lobed, small, and early deciduous; inflorescence racemose, few-flowered; rhachis, pedicels, bracts, and calyx rather closely stellate-pubescent; bracts short, merely bidentate or shortly bifid; calyx deeply cleft, lobes lanceolate or ovate, long-acuminate, sparsely ciliate;



petals rose-purple, retuse; carpels glabrous, favosely rugose-reticulate.

Stamineal column slender, the outer series of phalanges closely approximate to the inner at the summit, more or less united into pairs as in the perennial species; anthers abortive or wanting in the pistillate flowers.

Distribution: dry hillsides in the Sierra Nevada foothills of California from Shasta County to Mariposa County, in the Sacramento Valley, and in the coastal region from Mendocino County to San Francisco County.

Specimens examined:

CALIFORNIA: SHASTA COUNTY—Burney, 17 June 1923, *Bethel* (CAS); BUTTE COUNTY—Chico, May 1878, *Bidwell* (ANSP); Little Chico, June 1883, *Austin* (G TYPE of *S. Hartwegi* var. *tenella* Gray, ND); Chico, 1883, *Parry* (M); Chico, 27–28 April 1885, *Gray* (C); Clear Creek, 15–30 April 1897, *Brown* 1931½ (ANSP, F, M, S, US); Forest Ranch, 3 May 1897, *Austin* 1873 (US); Forest Ranch, May 1897, *Bruce* 1873 (P); plains, May 1887, *Bruce* 1922 (P); plains, March 1897, *Austin* 1922 (US); mountain gorges, May 1898, *Bruce* 2389 (P); Berry Canyon, near Clear Creek, 9 May 1902, *Heller & Brown* 5212 (ANSP, F, G, M, P, S, US); 2 miles from Chico, 16 April 1914, *A. A. Heller* 11298 (CAS, F, G, M, ND, OAC, S, US); hills 8 miles north of Oroville, 11 May 1914, *A. A. Heller* (G, M, S); ten miles north of Chico, 15 April 1917, *A. A. Heller* 12675 (ANSP, CAS, F, G, M, OAC, S, US); Richardson Springs road, 5 miles from Chico, 28 April 1926, *A. A. Heller* 13934 (US); near Little Chico Creek, 7 May 1927, *A. A. Heller* 14366 (ANSP); YUBA COUNTY—Brownsville, 1880, *Hill* (M); Los Vergils, 22 May 1921, *Eastwood* 10516 (CAS, G); NEVADA COUNTY—22 miles east of Marysville, 11 May 1911, *W. W. Jones* 133 (G); Nevada City, 20–22 June 1912, *Eastwood* 602 (CAS, G, M); near Grass Valley, 25 May 1919, *A. A. Heller* 13198 (ANSP, CAS, F, G, M, S, US); PLACER COUNTY—Auburn, May 1878, *Austin* 11467 (G, M); Auburn, 1882, *Ames* (ANSP); Colfax, 3 July 1882, *M. E. Jones* (P); Auburn, May 1891, *Ames* (P); Palm Avenue, Auburn, April 1895, *Ames* (US); Rose Springs, 28 May 1926, *Bacigalupi, McMunn & Mason* 1499 (S); ELDORADO COUNTY—Coloma, 30 May 1901, *Rix-*

ford (G, US); Sweetwater Creek, 15 May 1907, *K. Brandegee* (ANSP, M, P, US); without locality, *Curran* (G); AMADOR COUNTY—New York Falls, 2000 ft. alt., April 1893, *Hansen 507* (M, S); Clinton, 2000 ft. alt., 1 June 1894, *Hansen 507* (US); New York Falls, 1500 ft. alt., 2 June 1894, *Hansen 508* (US); Agr. Station, May 1892, *Hansen* (M, S); CALAVERAS COUNTY—Reservoir, 18 May 1887, *B. H. Smith* (ANSP); near Wallace, about 300 ft. alt., 7 May 1927, *Stanford 220* (CP, OAC); near Burson, about 500 ft. alt., 12 May 1928, *Stanford 1005* (CP); Mokelumne Hill, *Blaisdell* (CAS, US); TUOLUMNE COUNTY—near French Flat, 1300 ft. alt., 25 April 1919, *W. J. Williamson 12* (CAS, CP, P, S, US); MARIPOSA COUNTY—Aqua Tria, April 1880, *Congdon* (G); summer of 1880, *Hollick* (US); April–June 1883, *Congdon* (US); Whitlocks, 20 May 1893, *Congdon* (S); Lewis, 25 April 1895, *Congdon* (S); Stockton Creek, 18 May 1902, *Congdon* (US); 1914, *Faunt le Roy* (CAS); Blockman's Ranch, April 1915, *Eastwood* (CAS, G, US); FRESNO COUNTY—Base Camp, junction n. and s. forks King's River, 10 April 1923, *W. B. Duncan* (S); MENDOCINO COUNTY—Potter Valley, 19 May 1928, *Eastwood 12665* (CAS, P); SONOMA COUNTY—Sonoma Creek, 10 May 1885, *Rattan* (S); COLUSA COUNTY—Stony Creek, June 1884, *Rattan 21* (G, S); LAKE COUNTY—Lower Lake, 1 June 1893, *Blankinship* (G); Scott's Valley, 6 miles northwest of Lakeport, 1400–2000 ft. alt., 28 May–2 June 1902, *Tracy 1648* (US); near Lakeport, 12 May 1903, *C. F. Baker 2963* (CAS, G, M, ND, P, US); Lakeport, 16 May 1917, *Bentley* (S); NAPA COUNTY—Napa Valley, 1853–4, *Bigelow* (ANSP, G); Calistoga, 18—, *Parry* (M); west of Oakville, 12 May 1895, *Greene* (ND); White Sulphur Spr., St Helena, 8 May 1907, *Chandler 7567* (C); SOLANO COUNTY—Hartley's, 6 May 1930, *C. F. Baker 2877* (CAS, F, G, M, ND, P, US); SACRAMENTO COUNTY—Folsom, May 1883, *Curran* (OAC); SAN JOAQUIN COUNTY—Tracy, 25 April 1903, *C. F. Baker 2869* (ND); Clements, 7 May 1927, *Stanford 219* (CP, P); WITHOUT LOCALITY—*Hartweg 1669* (G TYPE); 1853–4, *Bigelow* (ANSP, US); 1882, *Parry* (US); 189—, *Austin 132a* (M); Central Pacific Railroad, May–June 1884, *A. H. Smith* (ANSP).

Brewer and Watson<sup>14</sup> in the 'Botany of California' inadvert-

<sup>14</sup> Brew. & Wats. Bot. Calif. 1: 83. 1876.

ently combined the two annual species, *S. Hartwegi* and *S. hirsuta* under the former name. Dr. E. L. Greene,<sup>15</sup> unaware of this error, described specimens of *S. Hartwegi* under the name of *S. tenella*, retaining the name of *S. Hartwegi* for those plants which rightfully belong to *S. hirsuta*. In 'Flora Franciscana'<sup>16</sup> he reduced *S. tenella* to synonymy under *S. Hartwegi*. Dr. Gray<sup>17</sup> noted that the *S. tenella* of Greene was only a depauperate form of *S. Hartwegi* with much-reduced flowers and aborted anthers; nevertheless, he<sup>18</sup> later designated it *S. Hartwegi* var. *tenella*. The specimen in question is one collected by Mrs. Austin in the gravelly bed of Little Chico Creek, Butte County, and is merely a much-attenuate and pale form of the pistillate plant of true *S. Hartwegi*, and therefore not worthy of varietal rank. Although many plants of this species are very slender, others are much branched and have light-colored or even white flowers. Some forms of *S. Hartwegi* may easily be confused with *S. calycosa* of the Central Valley region but the carpels of *S. calycosa* have the long deep sulcations on the dorsal surface, whereas those of *S. Hartwegi* are rugulose. The two are often collected together and have been confused in herbaria. If the carpels are immature then the staminal column must be used for specific differentiation, since *S. Hartwegi* has the narrow phalanges of the perennials instead of the broad petaloid ones of the annuals.

## SECTION 2. PERENNES Roush

### 2. PERENNES Roush, new section

Perennials from a creeping rootstock, or a strong variously thickened woody root, mostly summer-flowering, leafy-stemmed or scapiform; basal, middle cauline, and upper cauline leaves strikingly different (rarely similar) as to lobing or segmentation; the outer staminal phalanges evident, closely approximate to the inner terminal ones, narrow and bifid, each lobe diantheriferous (except in *S. pedata*); carpels variously marked dorsally or smooth.

Sp. 5-18.

<sup>15</sup> Greene in Bull. Calif. Acad. Sci. 1: 7. 1884; *ibid.* 79. 1885.

<sup>16</sup> Greene, Fl. Francis. 103. 1891.

<sup>17</sup> Gray in Proc. Am. Acad. 21: 210. 1886.

<sup>18</sup> Gray, Syn. Fl. N. Am. 1: 303. 1897.

## KEY TO THE SPECIES

- a. Stems usually erect and leafy; basal leaves lobed, not parted; basal and cauline leaves dissimilar.
  - b. Plants mostly glabrous; carpels mostly smooth.
    - c. Inflorescence a close raceme; flowers white or yellowish; plants of the Rocky Mountains.....5. *S. candida*
    - cc. Inflorescence an elongated raceme; flowers deep purple; plants of the ciscascade region from coastal British Columbia to midwest Oregon.....6. *S. Hendersoni*
  - bb. Plants more or less pubescent; carpels mostly reticulate.
    - c. Inflorescence spiciform; pedicels mostly short.
      - d. Plants mostly hirsute at the base; inflorescence densely spicate. ....7. *S. spicata*
      - dd. Plants with a soft silky pubescence; inflorescence shortly or interruptedly spicate; plants of Tulare County, California.....7a. *S. spicata* var. *ranunculacea*
      - ddd. Plants harshly puberulent, occasionally glabrescent; inflorescence elongated, spiciform; plants of the northern Great Basin extending to central Oregon.....8. *S. oregana*
      - dddd. Plants harshly puberulent; inflorescence shortly spiciform; plants of the Umpqua Valley, Oregon.....8a. *S. oregana* var. *Cusickii*
    - cc. Inflorescence racemose; pedicels mostly long.
      - d. Flowers light rose to almost white.....9. *S. campestris*
      - dd. Flowers purple, rarely white in *S. neo-mexicana*.
        - e. Plants densely and softly stellate-pubescent; raceme loose, virgate.....10. *S. virgata*
        - ee. Plants slightly hirsute to stellate-pubescent; raceme dense, not virgate.
          - f. Stems with few long hairs; inland species.....11. *S. neo-mexicana*
          - ff. Stems glabrous and more or less glaucous; plants of southern California.....11a. *S. neo-mexicana* var. *parviflora*
          - fff. Stems with short stellate pubescence; plants of Inyo County, California.....11b. *S. neo-mexicana* var. *Covillei*
          - eee. Plants with mixed hirsute and stellate pubescence; raceme loose, not virgate.
            - f. Stems decumbent to suberect, not rooting at the nodes; coastal species.
              - g. Leaves hirsute, or sparsely stellate-pubescent; common coastal species.....12. *S. malvaeflora*
              - gg. Leaves with a soft, stellate tomentum; plants of the Santa Inez Mts. and from near Santa Barbara, California.....12a. *S. malvaeflora* var. *californica*
            - ff. Stems decumbent, rooting at the nodes; montane species.....13. *S. reptans*
    - aa. Stems ascending to suberect, mostly leafy; basal leaves lobed to parted; basal and cauline leaves similar (except in *S. robusta*).
      - b. Stems erect, or laxly procumbent, slender, not glaucous, stellate-pubescent (often somewhat scurfy) throughout.....14. *S. asprella*

- bb. Stems erect, stout, somewhat glaucous, glabrescent; plants of Butte County, California.....15. *S. robusta*
- bbb. Stems procumbent, rarely erect, slender, glaucous, glabrous or stellate-puberulent.....16. *S. glaucescens*
- aaa. Stems usually caespitose-ascending, somewhat leafy to scapiform; basal leaves parted; basal and cauline leaves dissimilar.
  - b. Plants caespitose and glaucous; flowers large, deep purple; plants of western Nevada.....17. *S. multifida*
  - bb. Plants scapose and hirsute; flowers small, rose-purple; plants of Bear Valley, San Bernardino County, California.....18. *S. pedata*

5. *S. candida* Gray in Mem. Am. Acad. N. S. 4: 20, 24. 1849 (Pl. Fendl. 20, 24. 1849); Gen. Ill. 2: 58. *pl. 120, f. 9.* 1849; Walp. Ann. 2: 151. 1851-52; Torr. & Gray in Pacif. R. R. Rept. 2: 126. *pl. 2.* 1855; Wats. Bot. King Exp. 46. 1871; Porter, Fl. Colo. 16. 1874; Garden 24: 396. *text-fig.* 1883; *ibid.* 28: 29. *text-fig.* 1885; Greene in Bull. Calif. Acad. Sci. 1: 74. 1885; Coulter, Man. Bot. Rocky Mt. 41. 1885; Gray in Proc. Am. Acad. 22: 286. 1887; E. G. Baker in Jour. Bot. 29: 51. 1891 (Synopsis Malveae, 30. 1894); Rev. Hort. 63: 356. *text-fig.* 1891; Gray, Syn. Fl. N. Am. 1<sup>1</sup>: 304. 1897; L. H. Bailey in Bailey, Cyc. Am. Hort. 4: 1667. 1902; Jour. Hort. III, 56: 451. *text-fig.* 1908; Nelson in Coulter & Nelson, Man. Bot. Cent. Rocky Mt. 317. 1909; Hubbard in Bailey, Stand. Cyc. Hort. 6: 3162. *f. 3615.* 1917; Rydb. Fl. Rocky Mts. 558. 1917, and ed. 2. 558. 1922; Bailey, Man. Cult. Pl. 486. 1924.

Pl. 5, figs. 3 and 5; pl. 8, fig. 1.

*S. candida* var. *tincta* Cockerell in Bot. Gaz. 29: 280. 1900.

Perennial from a slender creeping rootstock; stem erect, 4-9 dm. high, simple, strict, mostly glabrous and leafy up to the inflorescence; leaves thin, ciliate, the upper surface glabrous, the lower with few stiff hairs on the veins; basal leaves orbicular, 4-15 cm. broad, about 7-lobed, the lobes coarsely and obtusely dentate, sinus truncate; middle cauline leaves 5-20 cm. broad, cut more than half-way to the base, segments 2-3-dentate at apex; upper cauline leaves 4-10 cm. broad, parted into 1-7 somewhat lance-linear and mostly entire segments; stipules ovate, ciliate; inflorescence terminal, racemose, densely flowered, 7-10 cm. long, 3 cm. broad; rhachis, pedicels, and calyx densely stellate-pubescent; bracts broadly lanceolate or ovate, ciliate;



calyx-lobes broadly deltoid, margin ciliate and veins pubescent; petals obovate, emarginate, 10–15 mm. long, white or yellowish (rarely pink-tinted); anthers blue (rarely pink before dehiscence); carpels 7–9, smoothish or slightly reticulate, glabrous except at the minutely hairy apex.

Distribution: along mountain streams in the Rocky Mountains from southern Wyoming to New Mexico and west to Utah and Nevada.

Specimens examined:

WYOMING: Cummins, 28 July 1895, *A. Nelson 1489* (G, M, US); Centennial Valley, 9 June 1895, *A. Nelson 1296* (G); Centennial, Albany Co., 6 Aug. 1900, *A. Nelson 7967* (G, M, P, US); Chimney Park, 1 Aug. 1901, *E. Nelson 651* (G); Copperton, alt. 8700 ft., 6 Aug. 1901, *Tweedy 4569* (US); Centennial, Albany Co., 2 Sept. 1903, *Goodding 2120* (G, M, US).

COLORADO: without locality, 1862, *Hall & Harbour 85* (ANSP, F, G, M); Middle Park, Aug. 1862, *Parry 429* (G, M); without locality, 1864, *Parry 85 (1862)* (US); Rocky Mts., 1868, *Vasey 89* (M, US); Breckenridge, Rocky Mts., 1871, *T. S. Brandegee 124* (C, M); Eagle River, 20 Aug. 1873, *J. M. Coulter* (ANSP, F, G); Middle Park, near Hot Springs, 9000 ft. alt., 29 July 1874, *E. A. Barber* (US); Crestone, Sangre de Cristo, 9500 ft. alt., Sept. 1877, *T. S. Brandegee* (C); Hot Sulphur Springs, Middle Park, 13 Aug. 1884, *C. S. Sheldon 211* (US); Cameron Pass, 1888, *Cassidy* (F); Gunnison, July 1888, *Eastwood 12* (US); Breckenridge, 1888, *Wislizenus 841* (M); Cameron Pass, 10,000 ft. alt., 7 Sept. 1890, *Crandall 201* (P); Cameron Pass, 10,000 ft. alt., 7 Sept. 1890, *Crandall* (US); Cameron Pass, 9800 ft. alt., 7 Sept. 1890, *Crandall 81* (US); Michigan Hill, Cameron Pass, 9500 ft. alt., 7 Sept. 1890, *Crandall 107* (G); Surface Creek, Delta Co., 6100 ft. alt., July 1892, *Purpus 230* (F); Hotchkiss, 22 June 1892, *Coven* (SCW); Pagosa Springs, 7000 ft. alt., 20 July 1893, *B. H. Smith* (ANSP); mountains of Larimer Co., Aug. 1893, *Osterhout* (W); near Steamboat Springs, 7000 ft. alt., 16 July 1894, *C. F. Baker* (P); Telluride, 10,500 ft. alt., 20 Aug. 1894, *Tweedy 134* (US); Wolcott, Eagle Co., 11 July 1896, *Biltmore Herb. 3486a* (Colo. Exped. 1–684) (G, US); LaVeta, 14 July 1896, *Shear 3638* (US); on Grizzly Creek, 8000 ft. alt., 24 July 1896, *C. F. Baker*



(M); Estes Park, 18 July 1897, *Osterhout* (M, US); foothills above Dix, 10 July 1898, *M. E. Jones* 679 (G, M, P); McCoy, 30 July 1898, *Shear & Bessey* 5305 (US); Red Dirt Divide, 31 July 1898, *Shear & Bessey* 3968 (US); foothills above Dix, 10 July 1898, *Baker, Earle & Tracy* 679 (G, M, P, US); Piedra, 14 July 1899, *C. F. Baker* (P); near Breckenridge, Summit Co., 9700 ft. alt., Aug. 1901, *Mackenzie* 101 (M, US); Gunnison, 7680 ft. alt., 31 July 1901, *C. F. Baker* 670 (M, P, US); Rogers, 14 Aug. 1901, *C. F. Baker* 800 (C, G, M, P, US); Williams Fork, Routt Co., 27 July 1903, *Sturgis* (C, G); Steamboat Springs, 20 July 1903, *Goodding* (US); Baxter Pass, Book Plateau, Routt Co., 8500 ft. alt., 22 Sept. 1906, *Cary* 116 (US); Eldora, 8600 ft. alt., 28 July 1906, *Daniels* 162 (M); vicinity of Mount Carbon, Gunnison Co., 2730 m. alt., 6 July 1910, *Eggleston* 5868 (US); north of Tomichi Dome, Gunnison Co., 2700 ft. alt., 18 Aug. 1911, *Marsh* 7739 (US); Paradox Creek, Montrose Co., 7500 ft. alt., 20 July 1912, *E. P. Walker* 323 (G); Tabogauche Basin, 8000 ft. alt., 21 July 1913, *Payson* 138 (G, S); Tabogauche Basin, 8000 ft. alt., 20 Aug. 1913, *Payson* 192 (G, F, M); Dillon, Summit Co., 2670 m. alt., 13-14 Sept. 1915, *Eggleston* 11958a (US); Eldora, Boulder Co., 8800 ft. alt., 6 Aug. 1918, *Clokey* 3175 (G, M, P, S); Tolland, 8900 ft. alt., 2 Aug. 1919, *Munz* 3186 (P); Rocky Mts., *Vasey* (M); without locality, *Purpus* 243 (C); base of Palisade Mts., near Brook, Larimer Co., 11 Aug. 1929, *Woodson* 1814 (M).

NEW MEXICO: *Fremont's Expedition to California*, 1845-7 (410, 1845) (ANSP, G, US); 1847, *Fendler* 80 (ANSP, G TYPE, M, US); Piedra Parada, 20 July 1859, *Newberry* (US); northern New Mexico, 1867, *Parry* 23 (M); mountains near Las Vegas, July 1881, *Vasey* (US); Hermit Peak, Aug. 1882, *Snow* (C, M, US); along Ruidoso Creek, in the White Mountains, Lincoln Co., 6600 ft. alt., 1 July 1895, *Wootton* (US); Comanche Valley, 8500 ft. alt., July 1896, *St. John* (G); Pecos River (Pecos River), Truchas Peak, 17 July 1898, *Coghill* 69 (M, US); Harvey's Ranch near Las Vegas, 1899, *Cockerell* (G, US COTYPE of *S. candida* var. *tincta* Cockerell); Harvey's Ranch near Las Vegas, 1899, *Beschle* (G); Silver Springs Cañon, 6 July 1899, *Wootton* (M, US); head of Pecos River, 8000 ft. alt., 17 July 1903, *V. Bailey* 552a (US);

Sandia Mountains, 23 July 1903, *Hedgcock* (M); mouth of Ponchuelo Creek, 8400 ft. alt., 30 June 1908, *Standley 4077* (G, M, US); vicinity of Chama, Rio Arriba Co., 2380–3850 m. alt., 8 July 1911, *Standley 6588* (US); Bartlett Ranch, Colfax Co., 4 Sept. 1913, *Wooton* (US); Balsam Park, Sandia Mountains, 8200 ft. alt., 10 Aug. 1914, *Ellis 214* (M, US); vicinity of Brazos Canyon, Rio Arriba Co., 31 Aug. 1914, *Standley & Bollman 10969* (US); southeast of Cuba, 8300 ft. alt., 30 July 1915, *Read 17* (US); vicinity of Ute Park, Colfax Co., 2200–2900 m. alt., 30 Aug. 1916, *Standley 14062* (US); Clouderoft, Aug. 1920, *Schulz 289* (P).

UTAH: Wasatch Mts., 6000 ft. alt., July 1869, *Watson 194* (G, US); Beaver City, 1877, *Palmer 62* (G, M, US); Park City, 8000 ft. alt., 18 Aug. 1881, *M. E. Jones 2139* (P, S); Elk Ranch, 7000 ft. alt., 12 Sept. 1894, *M. E. Jones 6039f* (P, US); La Sal Mts., 7000–8000 ft. alt., Aug. 1899, *Purpus 6697* (C, M, P, US); Parley's Park, 28 Aug. 1901, *M. E. Jones* (P); Fish Lake, around Twin Creeks, 8 Aug. 1905, *Rydberg & Carlton 7486, 7610* (G, US); Gogorza, Summit Co., about 6350 ft. alt., 11 Aug. 1908, *Garrett 2287* (Gar., G); Parley's Park, Kimball's, Summit Co., 19 July 1909, *C. P. Smith 1876* (F, S); Holiday Park, Uinta Mts., 14 Aug. 1911, *Mrs. J. Clemens* (P); Elk Mountains, near Scorup's Camp, 2500 ft. alt., 8 Aug. 1911, *Rydberg & Garrett 9528* (Gar., M); Gooseberry Ranger Station, Fishlake National Forest, Wasatch Mountains, Sevier Co., 2400 m. alt., 3 Aug. 1914, *Eggleston 10372* (US); Salina Experiment Station, Fishlake Forest, Wasatch Mountains, Sevier Co., 2400 m. alt., 28–29 Aug. 1915, *Eggleston 11716* (US).

NEVADA: Muncy, 2 July 1891, *A. J. Jones* (M).

This species is unlike any other in the genus, being the most distinct in the leaf-form, almost entirely lacking in pubescence, except in the inflorescence, usually having single terminal racemes and large, whitish or yellowish flowers with blue anthers (pink in some specimens). Its habitat along streams in the high Rockies may account for the glabrous condition. Although often cultivated, there are many forms in cultivation under this name that are more nearly related to *S. neo-mexicana* but pass under the name of *S. malvaeflora*, an older untenable name for *S. neo-*

*mexicana*. Once the characters of *S. candida* are known there is no possibility of its being confused with any other species.

*Sidalcea candida* var. *tincta* Cockerell is only a local color form of the species.

6. *S. Hendersoni* Wats. in Proc. Am. Acad. 23: 262. 1888; E. G. Baker in Jour. Bot. 29: 52. 1891 (Synopsis Malveae, 31. 1894); Gray, Syn. Fl. N. Am. 1<sup>a</sup>: 306. 1897; Howell, Fl. N. W. Am. 101. 1897; Piper, Contr. U. S. Nat. Herb. 11: 388. 1906; Piper & Beattie, Fl. N. W. Coast, 238. 1915.

*S. malvaeflora* var. *Oregana* Watson acc. to Macoun, Cat. Can. Pl. 3: 501. 1886.

*S. malvaeflora* Gray acc. to Macoun, Cat. Can. Pl. 5: 313. 1890.

Perennial from a woody root, glabrous or nearly so throughout; stem erect, stout, mostly simple, up to 12 dm. high; basal leaves orbicular, 5-7-lobed, the lobes crenate or dentate, ciliate; middle cauline leaves up to 12 cm. broad, cleft more than half-way, the lobes or segments broad and coarsely dentate, sparsely pubescent on the upper surface or only on the veins, ciliate; the upper cauline leaves 3-5-parted into narrow, coarsely dentate segments; stipules often purplish, lanceolate or linear, acute; inflorescence purplish, elongate, densely or laxly racemose; rhachis and bracts sparsely stellate, pedicels and lower part of calyx more densely stellate-pubescent; bracts purplish, mostly simple, of about equal length with the pedicel, somewhat scarious and ciliate; calyx large, accrescent, reticulate-veined, lobes purple-tipped, rarely green, ovate and abruptly acute or acuminate, glabrous or nearly so, ciliate; petals drying a deep purple, emarginate; carpels grayish, 7 or 8, smooth and glabrous, the apiculation slender, persistent.

Distribution: in marshes near the sea, Vancouver Island, British Columbia, Washington, Oregon, and small islands along the coast.

Specimens examined:

CANADA:

BRITISH COLUMBIA: Victoria, 1883, *Meehan* (ANSP); near Victoria, May 1885, *Fletcher* (G); Oak Bay, Vancouver Island,

June 1887, *Macoun* (US); Vancouver Island, 21 July 1893, *Macoun* 53 (G, ND); Alberni, vicinity of Victoria, 1 July 1908, *Macoun* (F); Vancouver Island, July 1915, *Carter* (G); Alberni, Vancouver Island, July 1916, *Carter* 376 (G); Lower Fraser Valley, 20 Sept. 1917, *Henry* (S).

UNITED STATES:

WASHINGTON: Satchop (Satsop) River, 1838-42, *Wilkes Expl. Exp.* 206 (US); Seattle, 9 July 1889, *Piper* 723 (G, ND, W, probably cultivated specimens); Seattle, 15 July 1892, *Mosier* (US); mouth of Snohomish River, near Everett, July-Sept. 1895, *Claypool* (SCW); Whidby Island, 20 June 1897, *Gardner* (C, SCW, W); Hoquiam, 29 June 1897, *Lamb* 1218 (M, S, SCW, US); Everett, 7 July 1904, *Piper* 4915 (G, SCW, US); tide flats, Hoquiam & Aberdeen, 20 June 1908, *Foster* 801 (US); San Juan Island, 14 July 1914, *Pope* (W); tideland, Marysville, July 1927, *J. M. Grant* (P).

OREGON: Saturna Island, 1858, *Lyall* (G); mouth of the Umpqua, 15 June 1887, *T. Howell* 734 (G); near Clatsop Bay, 3 July 1887, *Henderson* 1413 (G TYPE); near Nestucca Bay, Aug. 1909, *Peck* 6857 (Wil.);  $\frac{1}{2}$  mile north of Divide, 18 June 1919, *J. C. Nelson* 2646 (G); Cottage Grove, Lane County, 1920, *M. S. Clemens* (US); Seaside, Clatsop Co., 11-12 July 1922, *Abrams* 8917 (M, P, S, Wil.); south side of Sand Lake, 12 July 1924, *Peck* 13420 (Wil.); Cannon Beach, Clatsop Co., 1 Aug. 1929, *Henderson* 11360 (O).

Some of the collections cited in the 'Synoptical Flora'<sup>19</sup> under *S. glaucescens* prove to be *S. Hendersoni*. This restricts the range of the former to California and Nevada, leaving the distribution of the latter near the waters of Puget Sound and the rivers of the coastal counties extending to middle-western Oregon. Most of the plants of this species are practically glabrous except on the calyx-lobes. However, a collection by *Pope* (W. Herb. No. 1202) has long sparse hairs over its entire surface. The leaves have much the same form as those of *S. oregana* but, with the exception of the specimen cited, are bright green and glabrous. The inflorescence usually has a purplish tinge, although plants collected by *Henry* (S. Herb. No. 153110) show none of

<sup>19</sup> Gray, Syn. Fl. N. Am. 1<sup>1</sup>: 306. 1897.

this color, but are grayish-green throughout. The flowers are ordinarily deep purple, and even the calyx-lobes are typically, but not constantly, purple-tipped. The pistillate flowers are very small and appear different from those that are perfect. This is a very well-defined species and not closely related to any other of the Northwest.

7. *S. spicata* (Regel) Greene in Bull. Calif. Acad. Sci. 1: 76. 1885; Gray in Proc. Am. Acad. 22: 288. 1887; Greene, Fl. Francis. 104. 1891; E. G. Baker in Jour. Bot. 29: 52. 1891 (Synopsis Malveae, 31. 1894); Gray, Syn. Fl. N. Am. 1<sup>st</sup>: 306. 1897; Howell, Fl. N. W. Am. 101. 1897; H. M. Hall in Univ. Calif. Publ. Bot. 4: 201. 1912; Hubbard in Bailey, Stand. Cyc. Hort. 6: 3162. 1917; Smiley in Univ. Calif. Publ. Bot. 9: 265. 1921; Jepson, Man. Fl. Pl. Calif. 629. 1925.

Pl. 6, fig. 5; pl. 10.

*Callirhoe spicata* Regel in Gartenfl. 21: 291. pl. 737. 1872.

*Sidalcea valida* Greene in Pittonia 3: 157. 1897.

*S. hydrophila* Heller in Muhlenbergia 1: 107. 1904.

*S. eximia* Greene in Cyb. Columb. 1: 34. 1914; Jepson, Man. Fl. Pl. Calif. 629. 1925.

*S. Nelsoniana* Piper in Proc. Biol. Soc. Wash. 32: 41. 1919.

"*Sidalcea Murrayana*" in Gray, Syn. Fl. N. Am. 1<sup>st</sup>: 306. 1897, in synonymy.

Perennial from a strong woody root; stem slender or stout, mostly erect, 2-10 dm. high, often paniculately branched above, usually hirsute on the lower portions, rarely puberulent; basal leaves orbicular, 1-10 cm. broad, crenate, slightly lobed, or more or less parted into usually 3-lobed segments, on hirsute petioles up to 4.5 dm. long, upper surface glabrescent, or variously pubescent, lower surface more or less hirsute, especially on the veins; middle cauline leaves about 7-cleft, the segments acutely 3-5-lobed or more coarsely dentate, pubescence chiefly on the veins of the lower surface; upper cauline leaves smaller, parted into 3-7 linear and entire, rarely coarsely dentate segments, glabrous or slightly pubescent; inflorescence more or less densely spicate, 1-30 cm. long, 0.5-4 cm. wide (often elongating in fruit); rachis, bracts, and pedicels variously pubescent, corresponding to the



prevailing pubescence of stem and leaves; bracts often purple-tinged, linear, bifid, or subulate, merely ciliate, or hirsute; pedicels very short, slightly elongating after anthesis, glabrescent, hirsute, or stellate-puberulent; calyx very small, accrescent, glabrescent, closely stellate or strikingly hirsute; the lobes ovate, acute or acuminate, ciliate; petals varying from deep purple to a delicate rose-pink, small and narrow, erose or emarginate; carpels smooth or slightly reticulate.

Distribution: Lake Tahoe region of Nevada, northeastern and southwestern Oregon, and California along the coast to Sonoma County; the Coast Ranges to Napa County; and the Sierra Nevada to Mono County.

Specimens examined:

NEVADA: Truckee Valley, 4000 ft. alt., July 1867, *W. W. Bailey* 192 (US); Reno, 29 Aug. 1898, *Hillman* (P); about Washoe Lake, 1570 m. alt., 25 June 1902, *C. F. Baker* 1168 (C, CAS, G, M, P, US); Washoe Lake, June 1902, *C. F. Baker* (P); Lake Tahoe, 6300 ft. alt., 5 Aug. 1906, *Kennedy* 1420 (US); Little Valley, Washoe Co., 4 July 1907, *C. L. Brown* (ANSP, G); Franktown, 5000 ft. alt., 28 June 1909, *A. A. Heller* 9781 (ANSP, G, F, S, US); summit above Glenbrook, June-Aug. 1911, *K. Brandegee* (C); Glenbrook, on Lake Tahoe, 1890 m. alt., 7 July 1919, *Tidestrom* 10391 (US); south of Martelle Lake, 2010 m. alt., 8 July 1919, *Tidestrom* 10441 (US).

OREGON: UMATILLA COUNTY—Meacham, July 1915, *Peck* 6869 (Wil.); UNION COUNTY—above La Grande, 1 Aug. 1910, *Peck* 6875 (Wil.); Hot Lake, 1 Aug. 1915, *Peck* 6874 (Wil.); BAKER COUNTY—3 miles west of Whitney, 22 July 1921, *Peck* 10351 (S); Sumpter, Blue Mts., 8 July 1919, *Ferris & Duthie* 1062 (S); HOOD RIVER COUNTY—Cloud Cap, Mt. Hood, summer 1929, *Van Dyke* (CAS); CROOK COUNTY—at Farewell Bend, 1270 m. alt., 18 July 1894, *Leiberg* 483 (C, G, M, P, S, US); near the desert, 1897, *Cusick* 1668 (C, G); Laidlaw, 19 July 1906, *Whited* 3099 (O, OAC, US); DESCHUTES COUNTY—Paulina Lake, 28 Aug., *Detling* 281 (O); Bend, 27 July 1914, *Peck* 6848 (Wil.); bank of Deschutes River, 15 mi. s. of Bend, 11 July 1925, *Peck* 14314 (S); island in Deschutes River at Tumalo, 1 July 1921, *Whited* 252 (S); Bend near Deschutes River, 1 Aug. 1922, *Abrams* 9616



(P, S); LAKE COUNTY—Crooked Creek, July 1886, *Austin* (C); Warner Range, 1700 m. alt., 25 June 1896, *Leiberg* 2657 (O); Warner Range, 1700 m. alt., 25 July 1896, *Coville & Leiberg* 45 (US); Warner Range, 1900 m. alt., 26 July 1896, *Coville & Leiberg* 66 (US); Congon Peak, 1900 m. alt., *Coville & Leiberg* 205 (US); about 10 miles south of Lakeview, 1450 m. alt., 19 June 1911, *Eggleston* 7031 (US); Paisley, 4200–5000 ft. alt., Sept. 1914, *Elder* 7 (US); near Paisley, 4200–5000 ft. alt., Sept. 1914, *Elder* 70 (OAC); near Paisley, June 1915, *Elder* 168 (OAC); Goose Lake Valley, near Lakeview, 28 June 1927, *Peck* 15297 (M, S, Wil.); 35 miles northwest of Lakeview, 1 July 1927, *Peck* 15406 (Wil.); 35 miles northwest of Lakeview, 1 July 1927, *Peck* 15404 (S, Wil.); 35 miles northwest of Lakeview, 3 July 1927, *Peck* 15443 (M, S, Wil.); KLAMATH COUNTY—Klamath Valley, 4200 ft. alt., *Cronkhite* 82 (C, US); Buck Lake, 24 July 1897, *Coville & Applegate* 37 (US); 3 Aug. 1897, *Austin & Bruce* 1659 (P, US); Williamson River, July 1913, *Coombs* (CAS, G, US); Ashland, 14 July 1913, *Peck* 6861 (Wil.); Fort Klamath, 16 July 1920, *Peck* 9545 (G); 5 miles south of Beaver Marsh, 2–4 Aug. 1922, *Abrams* 9676 (P, S); Beattie, 25 June 1927, *Peck* 15205 (S, Wil.); Beattie, 25 June 1927, *Peck* 15205a (Wil.); High Cascades, 30 miles east of Medford, June 1927, *Heckner* (Wil.); Crater Lake Park, 6500 ft. alt., 9 Aug. 1929, *Wynd* 1640 (O); HARNEY COUNTY—banks of Silvie's River in Bear Valley, 20 July 1898, *Cusick* 2053 (C, F, G, M, ND, O, P, US); MARION COUNTY—Salem, O. B. Johnson 243 (W); 1871, *E. Hall* 71 (G, M); near Portland, 20 July 1881, *T. Howell* 606 (G); Corvallis, 27 June 1916, *Gilbert* 875 (OAC); Salem, 5 June 1916, *J. C. Nelson* 650 (S, authentic material of *S. Nelsoniana* Piper); Salem, 12 June 1917, *J. C. Nelson* 1294 (G); 3 miles south of Salem, 21 June 1919, *J. C. Nelson* 2693 (S); 1 mile south of Salem, 23 June 1920, *J. C. Nelson* 3155 (Wil.); Woodburn, 19 July 1920, *M. S. Clemens* (US); Salem, 11 June 1921, *J. C. Nelson* 3843 (ANSP); ½ mile south of Salem, 2 July 1922, *J. C. Nelson* 4368 (G); 1 mile south of Salem, 2 July 1922, *J. C. Nelson* 4356 (OAC); 2½ miles north of Salem, 7 July 1922, *Abrams* 8761 (P, S); TILLAMOOK COUNTY—Tillamook, 31 May 1892, *Owens* (OAC); CLATSOP COUNTY—Cannon Beach, 1 July 1924, *Peck* 13224 (Wil.); Saddle

Mt., 3300 ft. alt., 10 June 1928, *Patterson 49* (O); DOUGLAS COUNTY—Glendale & Grant's Pass, 12 July 1887, *Henderson 151* (ANSP, O, S, OAC); Roseburg, Umpqua Valley, 26 June 1887, *T. Howell 1100* in part (M); JACKSON COUNTY—Ash Creek, July 1893, *Austin 4* (C); JOSEPHINE COUNTY—Takilma, 26–27 June 1912, *Peck 8029* (G, Wil.); Grant's Pass, 26 June 1886, *Henderson* (S); Grant's Pass, 20 May 1886, *Henderson* (S); Grant's Pass, June 1886, *Henderson* (G); Grant's Pass, 24 June 1909, *Peck 6863* (Wil.); Grant's Pass, 1909, *Peck 6871* (Wil.); base of Eight Dollar Mt., near Selma, 19 June 192–, *Henderson 7235* (O); near Eight Dollar Mt., near Selma, 20 June 1926, *Henderson 7234* (O); WITHOUT DEFINITE LOCALITY—Lake of the Woods, 14 Aug. 1896, *Gorman 443* (US); meadowland, 10 Aug. 1902, *Howard* (OAC); near Woodville, 1 July 1909, *Peck 6870* (Wil.); Woodruff Meadows, 2 July 1925, *R. A. Pendleton* (OAC).

CALIFORNIA: MODOC COUNTY—Forestdale, 1893, *M. S. Baker* (S); Davis Creek, July 1894, *Black* (ANSP); Lassen Creek, Aug. 1894, *Austin* (C); Parker Creek, 15 June 1919, *Ferris & Duthie 155* (RM, S); LASSEN COUNTY—Dixey Valley, 3 July, *M. S. Baker* (C); Susanville, 30 June 1892, *T. S. Brandegee* (C); Susanville Summit, 6000 ft. alt., 2 July 1897, *M. E. Jones* (P, US); 1 mile below Drakesbad, 5400 ft. alt., 24–26 Aug. 1925, *Cain 72* (S); PLUMAS COUNTY—29 July 189–, *Austin 1408* (US); Prattville, 3 July 1892, *T. S. Brandegee* (C); Prattville, 31 July 1920, *M. S. Clemens* (US); Prattville, 1906, *Coombs* (CAS); Portola, 1913, *K. Brandegee* (C); Gold Lake Region, Aug. 1917, *Sutcliffe* (CAS); Salmon Lake, 1 Sept. 1920, *Sutcliffe* (CAS); Drakesbad, 28 Aug. 1926, *M. S. Baker 338* (S); BUTTE COUNTY—Colby, July 1896, *Austin 209* (US); Chico Meadows, 4000 ft. alt., 6 Aug. 1914, *A. A. Heller 11645* (C, CAS, F, G, M, ND, OAC, S, US); Jonesville, 4000 ft. alt., 2 Aug. 1920, *H. F. Copeland 202* (S); Butte Meadows, 10 July 1928, *A. A. Heller 14650* (M); SIERRA COUNTY—Purdy, 1 July 1907, *Heller & Kennedy 8669* (ANSP, CAS, F, G, M, S, US); East Hot Springs, Sierra Valley, 27 Aug. 1909, *Dudley* (S); Loyalton, 29 June 1918, *Eastwood 7822* and *7821* (CAS); Salmon Lake, July 1918, *Sutcliffe* (CAS); Salmon Lake, Oct. 1925, *Sutcliffe* (CAS); Webber Lake, 6–12 Aug. 1927, *Haley* (CAS); NEVADA COUNTY—Soda Springs, 7000 ft. alt.,

21 July 1881, *M. E. Jones* 2433 (P); Donner Park, 31 July 1887, *Sonne* 342 (ANSP); Donner Park, Sept. 1888, *K. Brandegee* (C); Truckee, Aug. 1893, *Michener* (C); July 1897, *Blasdale* (C); Truckee, 16 July 1901, *Williamson* (ANSP); lower end of Donner Lake, 19 July 1903, *A. A. Heller* 6898 (ANSP, C, F, G, M, P, S, US); July 1913, *K. Brandegee* (C); Truckee, 1750 m. alt., 14 July 1913, *A. E. Hitchcock* 274 (US); Boca, July 1913, *K. Brandegee* (C); Cisco, 15 Aug. 1927, *A. A. Heller* 14446 (O); PLACER COUNTY—Hot Springs, 11 July 1886, *Sonne* 342 (S); Summit Station, Aug. 1888, *Greene* (G, M); Sierra Nevada Mts., Aug. 1892, *Carpenter* (C); Oct. 1892, *Carpenter* (C); Summit, 15 July 1908, *K. Brandegee* (C); ridge above Bear Valley, 7 July 1919, *V. Jones* (CAS); Cisco, 6000 ft. alt., 15 Aug. 1927 (ANSP, M); EL DORADO COUNTY—1866, *Rattan* (S); near Lake Tahoe, 6280 ft. alt., July 1899, *Hawthorne & Blaisdell* (CAS); Lake Tahoe, 27 July 1906, *Eastwood* 1098a (C); Fallen Leaf Lake, 27 July–15 Aug. 1906, *Eastwood* 1098 (CAS); Deer Park Springs, Lake Tahoe, 1909, *Newcomer* (S); road to Glen Alpine Springs, 19 July 1909, *Lathrop* (S); Fallen Leaf Lake, 1923, *Lorraine* (S); LAKE TAHOE REGION—Lake Tahoe, 31 Aug. 1872, *Redfield* 41 (M); 1890, *J. A. Sanford* 419 (C); 1 Aug. 1891, *W. H. Evans* (M); meadow back of Tahoe City, 29 June 1900, *Dudley* (S); June 1900, *King* (G); Lake Tahoe, 25 June 1906, *G. B. Grant* 7072 (C, P, S); Sunnyside, 1909, *Eastwood* 62 (CAS, US); Lake Valley, 6400 ft. alt., 27 July 1911, *Abrams* 4772 (C, G, P, S, US); near Lily Lake, 6600 ft. alt., 23 July 1913, *Smiley* 325 (G); near Suzy Lake Trail from Glen Alpine, 7500 ft. alt., 18 July 1913, *Smiley* 188 (G); Lake Tahoe, 6 Sept. 1920, *M. S. Clemens* (CAS); Lake Tahoe, Aug. 1920, *Keyes* (P); Hope Valley, 8500 ft. alt., Aug. 1892, *Hansen* 505 (M, P, S); Hope Valley, 20 July 1918, *W. H. Evans* (C); MONO COUNTY—Mono Pass, 1866–67, *Bolander* 6265 (M, G, US); Camp 125, near west branch of Walker's River, 15 July 1863, *Brewer* 1860 (C, US); Summit, Aug. 1883, *Curran* (G); Walker Lake, 17 Aug. 1894, *Congdon* 21 (G); Bloody Canyon, 20 July 1889, *Chesnut & Drew* (C); Walker Lake, 17 Aug. 1894, *Congdon* (C); Scott's Meadows, 21 Aug. 1898, *Congdon* (G); 26 Aug. 1908, *Minthorn* (C); meadow north of lake, Silver Lake, 7200 ft. alt., 26 June 1925, *Peirson* 6107 (P); near pass between

east and west forks of Walker River, 13 Aug. 1925, *H. M. Hall 12136* (C); SISKIYOU COUNTY—Mount Shasta, 25 Aug. 1880, *G. Engelmann* (M); near Yreka, 23 June 1876, *Greene 885a* (G, M); Happy Camp, Klamath, June 1879, *Rattan* (S); Sisson's, Shasta Co., July 1887, *T. S. Brandegee* (C); Sisson's, July 1888, *T. S. Brandegee* (C); Mount Shasta and vicinity, 13–27 July 1892, *Palmer 2532* (US); near Sisson, 3550 ft. alt., 1–10 June 1897, *H. E. Brown 337* (ANSP, C, F, M, S, US); Medicine Lake, 7000 ft. alt., Aug. 1897, *M. S. Baker 148* (C); Shackleford Canyon, 6000 ft. alt., June 1901, *Chandler 1707* (C); Sisson, 13 Sept. 1902, *G. B. Grant* (S); Sisson, 12 Aug. 1903, *E. B. Copeland 3822* (C, G, M, P, US); foothills of Goosenest Mountain, 22 June 1909, *Butler 905* (C); Quartz Valley, 6 July 1910, *Butler 1643* (P); Oro Fino, 17 July 1910, *Butler 1728* (CAS, C, M, OAC, P); Sisson, 18 July 1912, *Eastwood 1216* (CAS, G, M, US); 20 June 1913, *L. E. Smith 383* (CAS, G, US); south fork of Shasta River, Mount Eddy, Shasta Forest, 1850–2000 m. alt., 11–12 Aug. 1915, *Eggleston 11656* (US); Bray, July 1915, *L. E. Smith* (CAS); near Wagon Creek Falls, 20 July 1916, *A. A. Heller 12474* (ANSP, CAS, F, G, M, OAC, S, US); Castle Lake, 24 July 1921, *Eastwood 10766* (CAS); Medicine Lake, 28 July 1921, *Eastwood 10964* (CAS, G); in Shasta Valley, between Edgewood and Gazelle, 23 June 1928, *A. A. Heller 14647* (M); SHASTA COUNTY—Great Spring, Hat Creek, 4500 ft. alt., June 1903, *Hall & Babcock 4272* (C); Jason & Stewart's Camp, headwaters of Hat Creek, 2120 m. alt., 31 July–1 Aug. 1911, *Eggleston 7420* (US); TRINITY COUNTY—Union Creek, 4250 ft. alt., July 1909, *H. M. Hall 8688* (C); LAKE COUNTY—summit of Elk Mt., July–Aug. 1892, *Jepson* (C); Snow Mountain, 3700 ft. alt., 23 Aug. 1892, *T. S. Brandegee* (C); Webber Lake, 5 July 1901, *Kennedy & Doten 109* (C); near Hullville on the ridge between Eel River and Rice Creek, 11 Aug. 1902, *A. A. Heller 6047* (ANSP, G, M, P, US, COTYPES of *S. hydrophila* Heller); mountains of northern Lake County, Sept. 1902, *Mackie* (C); Elk Mountain, 4000–5000 ft. alt., 21 July–16 Aug. 1905, *Tracy 2288* (C); Elk Mountain, 4000–5000 ft. alt., 21 July–16 Aug. 1905, *Tracy 2351* (C); north slope of Elk Mountain, 25 July 1913, *H. M. Hall 9586* (C, US); NAPA COUNTY—Angwin's, Howell Mountain, 24 Sept. 1893, *Jepson* (C);

HUMBOLDT COUNTY—valley of Elk River, region about Humboldt Bay, 0-500 ft. alt., 25 June 1907, *Tracy 2578* (C, G, M, RM, S, US TYPE of *S. eximia* Greene); Murphy Meadow, Bald Mountain, 3500 ft. alt., 1 Sept. 1917, *Tracy 4831* (C, P); Trinity Summit, 5000 ft. alt., 18 Sept. 1919, *Tracy 5253* (C); Dow's Prairie, 200 ft. alt., 25 July 1920, *Tracy 5344* (C, CAS, P); Dow's Prairie, 200 ft. alt., 29 Aug. 1920, *Tracy 5394* (C); Trinity Summit, Elk Horn Prairie, 5000 ft. alt., 16 Aug. 1925, *Kildale 1188* (S); MEN-DOCINO COUNTY—Sherwood, 14-16 July 1915, *A. S. Hitchcock* (US); SONOMA COUNTY—Knight's Valley, June 1894, *Greene* (ND TYPE of *S. valida* Greene); Knight's Valley, Aug. 1894, *Booth* (ND authentic material of *S. valida* Greene); Kenwood, 19 July 1927, *M. S. Baker 2343* (S); Kenwood, 29 July 1928, *M. S. Baker 3203c* (C); WITHOUT LOCALITY—May-Oct. 1898, *Purpus* (C); Paynes Spring, 1 Aug. 1898, *M. S. Baker 493* (ANSP); 1877, *Vasey* (US); Sierra Nevada, 1887, *Parry* (M); Morgans Springs, 22-26 Aug. 1912, *Eastwood 1888* (CAS, M, US); Howell Mountain, Aug. 1888, *T. S. Brandegee* (C); Chat, 5300 ft. alt., 21 June 1897, *M. E. Jones* (P); 7 miles from French Meadows, 18 Aug. 1901, *Kennedy & Doten 411* (C, S); Gray Eagle Meadows, Feather River Region, 6000 ft. alt., 13 July 1920, *Head* (CAS); Prospect Peak, summer 1929, *Kramer* (CAS); Cahto, July 1869, *Kellogg & Harford 110* in part (US); Mt. Shasta, Sept. 1902, *Grant 5216a* (C).

When Dr. Greene<sup>20</sup> described his *S. spicata* from collections by Dr. Kellogg at Cisco, California, and by Mrs. Curran near Donner Lake, he said: "It may or may not be the *Callirhoe spicata* of Regel, neither the figure of which, nor any description, has been accessible to me, but no other *Sidalcea* has its racemes condensed into the appearance of a short spike, if we except the annual species at the end of this synopsis." Regel's<sup>21</sup> description applies more exactly to those less hirsute forms in the Sierra Nevada of California and in Oregon as being "basi hirsuta, caeterum glabriuscula," whereas Greene's description "equally hispid-hirsute throughout" applies not only to many of the plants of the Sierra Nevada region but especially well to those

<sup>20</sup> Greene in Bull. Calif. Acad. Sci. 1: 76. 1885.

<sup>21</sup> Regel in Gartenfl. 21: 291. pl. 737. 1872.



of the coastal areas (*S. eximia* Greene<sup>22</sup>). The figure of Regel's plant<sup>21</sup> shows it to be very similar to *S. hydrophila* Heller<sup>23</sup> from Lake County, California (*Heller No. 6047*) except for the length of the inflorescence; and it is not unlike *S. Nelsoniana* of Piper from near Salem, Oregon. *Sidalcea valida* Greene of Sonoma County is merely a paniculately branched form of *S. spicata*, with fewer hirsute hairs and more densely stellate pubescence.

It has seemed inadvisable to recognize all the species previously described in the *S. spicata* group. The type specimens are distinct but the intermediate forms are so numerous that no distinct and clear-cut lines can be drawn. Tracy considered his number 2578 (type of *S. eximia* Greene) from Humboldt County as merely a much more vigorous plant than those of the mountains. Since the flora of Humboldt County is conceded to be almost tropical in luxuriance, this robust and very hirsute form may be due to the habitat. All gradations of hirsuteness and leaf-form may be encountered as one passes from the coast region through Siskiyou and Trinity Counties to the Sierras, or in passing north into Oregon by way of Grant's Pass. The inflorescence varies from an extremely short glomerulate spike to a very long loose spike. The calyces are all small. The petals are large in the broadly spicate forms but extremely small in the pistillate flowers of the slender delicate spikes of the form described as *S. Nelsoniana* Piper. The carpels for the most part are smooth, though slight nervations may be found in some plants of drier habitats. The leaves, although mostly basal, in the more robust forms may continue to the inflorescence; and the lobes may be very coarsely dentate. There are indications in the specimens examined that a slight difference in the amount of available moisture (both soil and atmospheric) may make a great difference in the degree and kind of pubescence in this species.

7a. Var. *ranunculacea* (Greene) Roush, n. comb.

*S. ranunculacea* Greene, *Leaff. Bot. Obs.* 1: 75. 1904.

*S. interrupta* Greene, *ibid.*

Rootstock horizontal; leaves gray-green, silky villous-hirsute,

<sup>22</sup> Greene in *Cyb. Columb.* 1: 34. 1914.

<sup>23</sup> Heller in *Muhlenbergia* 1: 107. 1904.



ciliate; inflorescence a short, more or less interrupted spike, elongating after anthesis; rhachis, bracts, pedicels, and calyx densely stellate-pubescent with some long hairs intermixed, appearing villous-hirsute; carpels obviously though not strongly reticulated.

Distribution: mountains of Tulare, Kern, and San Bernardino Counties, California.

Specimens examined:

CALIFORNIA: KERN COUNTY—Greenhorn Mts., 1 June 1926, *Weston 167* (CAS); TULARE COUNTY—above Hockett's meadow, 2 Aug. 1904, *C. F. Baker 4318* (Coll. *Culbertson*) (CAS, C, G, M, P TYPE OF *S. ranunculacea*); Natural Bridge Meadow, 8000 ft. alt., 9 Aug. 1904, *C. F. Baker 4255* (Coll. *Culbertson*) (CAS, G, M, P TYPE OF *S. interrupta*); Natural Bridge of Volcano Creek, July 1904, *Hall & Babcock 5434* (C, S); Fish Creek, 8000 ft. alt., June 1904, *Hall & Babcock 5208* (C); Bonita Meadow, 8000 ft. alt., 20–24 June 1904, *Hall & Babcock 5176* (C); Giant Forest, Aug. 1905, *K. Brandegee* (C); north side of Toowa Range, 9000 ft. alt., 20 July 1908, *Hall & Hall 8404* (C); Clicks Creek, basin of Little Kern River, 6600 ft. alt., 15 July 1908, *Hall & Hall 8372a, b* (ANSP, C); Hossack Creek, 6500 ft. alt., 13 July 1908, *Hall & Hall 8362* (C); marshes, Sequoia National Park, July 1908, *Davidson 1716* (S); north fork of Middle Fork Tule River, 7500 ft. alt., 5 Aug. 1908, *Hall & Hall 8481* (C); Pine Flat, near Cal. Hot Springs, 2 June 1917, *Moxley 586* (C); vicinity of Mt. Moses, 6500 ft. alt., Sept. 1923, *Duncan* (S); Long Meadow, 8000–9000 ft. alt., 7–14 June 1888, *Palmer 203* (ND, M, US); Halsted Meadows, Sequoia National Park, 2150 m. alt., 8 Aug. 1891, *Coville & Funston 2103* (US); about 1½ miles below Mineral King, Sierra Nevada, 2700 m. alt., 4 Aug. 1891, *Coville & Funston 1462* (US); Mineral King, 27 July 1892, *T. S. Brandegee* (C); Kern River Valley, Tobias Meadow border, 16 July 1895, *Dudley 598* (S); borders Summer Home Meadow, region of Middle Tule River, 28 July 1895, *Dudley 914, 915* (S); above Pond Meadow, by small lake, Upper Kaweah River, 22 Aug. 1896, *Dudley 1721* (S); between Brook's Camp and Lone Pine, Upper Kaweah River, 22 Aug. 1896, *Dudley 1722* (S); near Middle Tule River, 8000–9000 ft. alt., April–Sept. 1897, *Purpus 5184* (C, G,

M, US); below Soda Spring, 6500-7500 ft. alt., 17 July 1897, *Dudley 1963* (S); Soda Spring, 6200 ft. alt., 28 July 1897, *Dudley 2303* (S); below Kern Kaweah Falls, 6000-8000 ft. alt., 31 July 1897, *Dudley 2350* (S); Lake of Islands vicinity, region of Kaweah Peaks, 11000-13000 ft. alt., 2 Aug. 1897, *Dudley 2392* (S); Mineral King, 8000 ft. alt., 22 Aug. 1899, *E. B. Copeland 23* (US); Thorpes Meadow, Giant Forest, 3 Aug. 1900, *Dudley 3013* (S); Round Meadow, Sequoia National Park, 13 July 1902, *G. B. Grant 1974* (S); Caboon Meadow, 9 July 1902, *Dudley* (S); SAN BERNARDINO COUNTY—Mare Flats, 8000 ft. alt., 8 July, *Crawford* (P); Seven Oaks Camp, San Bernardino Mts., 5000 ft. alt., June 1901, *G. B. Grant 1201* (C); on the Sierras between Alta Meadow and Sequoia, 28 Aug. 1917, *Munz 1555* (P); City Creek Grade, San Bernardino, 24 June 1926, *M. E. Jones* (P).

The peculiar form of inflorescence, the silky-villous hirsuteness of the leaves, and the more reticulate carpels, as well as the geographical range, separate this from the species sufficiently for varietal distinction.

8. *S. oregana* (Nutt.) Gray in Mem. Am. Acad. N. S. 4: 20. 1849 (Pl. Fendl. 20. 1849), in part; Greene in Bull. Calif. Acad. Sci. 1: 77. 1885; Gray in Proc. Am. Acad. 22: 287. 1887; Macoun, Cat. Can. Pl. 5: 313. 1890, as to name only; Greene, Fl. Francis. 104. 1891, in part; E. G. Baker in Jour. Bot. 29: 52. 1891 (Synopsis Malveae, 30. 1894), not as to Canadian plants; Greene, Man. Bay-Region Bot. 65. 1894; Gray, Syn. Fl. N. Am. 1: 305. 1897; Howell, Fl. N. W. Am. 102. 1897; Jepson, Fl. West. Mid. Calif. 240. 1901, and ed. 2. 260. 1911; Piper in Contr. U. S. Nat. Herb. 11: 388. 1906; Hubbard in Bailey, Stand. Cyc. Hort. 6: 3162. 1917; Rydb. Fl. Rocky Mts. 558. 1917, and ed. 2. 558. 1922; Jepson, Man. Fl. Pl. Calif. 628. 1925. Pl. 6, fig. 6; pl. 9.

*Sida oregana* Nutt. in Torr. & Gray, Fl. N. Am. 1: 234. 1838; Walp. Rep. 1: 316. 1842.

*Sidalcea malvaeflora* Gray in Brew. & Wats. Bot. Calif. 1: 84. 1876, in footnote.

*S. malvaeflora* Gray var. *Oregana* Watson acc. to Macoun, Cat. Can. Pl. 3: 501. 1886, as to synonymy only.

*S. nervata* A. Nels. in Proc. Biol. Soc. Wash. 17: 94. 1904; Nelson in Coult. & Nelson, Man. Bot. Cent. Rocky Mt. 317. 1909; Rydb. Fl. Rocky Mts. 558. 1917, and ed. 2. 558. 1922; Tidestrom in Contr. U. S. Nat. Herb. 25: 353. 1925.

*S. campestris* Greene acc. to Rydb. Fl. Rocky Mts. 558. 1917, and ed. 2. 558. 1922, as to name only.

Perennial from a woody root, mostly stellate-puberulent throughout; stems solitary or few, simple or paniculately branched, erect, up to 15 dm. high, often glabrous below but puberulent toward the inflorescence; leaves large, coarse, strongly nerved below, harsh with a dense stellate pubescence, particularly on the lower surface; basal leaves orbicular or reniform, up to 10 cm. broad, about 8-lobed, the lobes cuneate, 2-3-dentate, petioles as much as 30 cm. long; middle cauline leaves 5-7-parted, the cuneate, lanceolate, or linear segments incisely tri-dentate or more deeply cleft; upper cauline leaves pedately parted into 3-5 linear, mostly entire segments; inflorescence a more or less elongated spiciform raceme, often reaching a length of 30 cm., singly or paniculately disposed; rhachis, bracts, pedicels, and calyx rather densely puberulent; bracts linear or subulate, rarely bidentate or bifid; calyx-lobes ovate-lanceolate, acute, or shortly acuminate; petals of the perfect flowers rose-purple, obovate, emarginate, 1-2 cm. long, those of the pistillate flowers a third smaller and of deeper color; carpels smoothish or lightly reticulated.

Distribution: roadsides, moist meadows, and along streams, southwest Montana to Utah, west to southeastern Washington and northern California.

Specimens examined:

MONTANA: Middle Creek Canyon, Gallatin Co., 31 July 1902, W. W. Jones (G); Chisholm Camp, 6500 ft. alt., 31 July 1902, Blankinship (C, G); Middle Temperate Life Zone, 3000 ft. alt., 19 July 1909, M. E. Jones (C, M, P, S).

WYOMING: near Ft. Bridger, Aug. 1892, Leidy (ANSP, US); Evanston, 14 July 1883, J. A. Sanford (C, ND); La Barge, Uinta Co., 15 July 1894, Stevenson 119 (US); Evanston, 27 July 1897, A. Nelson 4101 (RM TYPE of *S. nervata* A. Nels.); Evanston, 10 July 1897, Williams (CAS, US).

IDAHO: Boise City, June 1881, *Wilcox* (G); July 1889, *Sandberg* (F, US); June–July 1892, *Aiton* 62 (M); Palouse Country, June–July 1892, *Aiton* 1344 (M); 15 miles south of Moscow, 14 June 1892, *Sandberg*, *MacDougal* & *Heller* 391 (C, G, M, P, S, US); near Julietta, Latah Co., 13 June 1892, *A. A. Heller* 391 (ANSP); June 1892, *Sandberg* (C); Lake Waha, Aug. 1894, *Leiberg* (O); Curlew Gulch, 28 June 1892, *Mulford* (M); Moscow & Camas Prairie, 27 June, 24 July, 5 Sept. 1894, *Henderson* (US); forks of St. Mary's River, 950 m. alt., 3 July 1895, *Leiberg* 1140 (C, F, G, M, O, US); s. w. corner of Big Camas Prairie, 5000 ft. alt., 14 July 1895, *Henderson* 3106 (O, US); Lake Waha, Nez Percés Co., 2500–3000 ft. alt., 19 June 1896, *Heller* & *Heller* 3260 (C, F, M, S, US); Mann's Creek, Washington Co., 2200 ft. alt., *M. E. Jones* 6208 (P, M); Salubria, 10 July 1899, *M. E. Jones* 6207 (P, RM, S, US); near Moscow, 18–24 July 1899, *Henderson* (S); Moscow, Latah Co., June 1900, *Abrams* 732 (C, P); Big Willow, Canyon Co., 3000 ft. alt., 31 May 1910, *Macbride* 165 (G, M, RM, SCW, US); Saw-tooth National Forest, Hailey, 1910, *Woods* 335 (RM); Saw-tooth National Forest, 1910, *Woods* 2621 (RM); Silver City, Owyhee Co., 7000 ft. alt., 18 July 1910, *Macbride* 412 (M, RM); Ketchum, Blaine Co., 5887 ft. alt., 20 July 1911, *Nelson* & *Macbride* 1204 (G, M, S, RM); Payette National Forest, 21 July 1911, *Miles* (US); Payette Forest, 21 July 1911, *Miles* 172 (RM); Tamarack, 4 Aug. 1911, *J. A. Clark* 185 (C, S, US); Dry Buck, Boise Co., 16 Aug. 1911, *Macbride* 1639 (C, G, M, P, RM, S, SCW, US); near Boise, 1916, *Gageby* (RM); Camas Prairie, Blaine Co., 15 Aug. 1916, *Macbride* & *Payson* 3807 (C, CAS, G, M, P, RM, S, US); along Palouse River, 10 Oct. 1922, *Cramer* (S); Thatuna Hills, 6 July 1926, *Epling* & *Houck* 9186 (M, UCLA); Pierce to Oxford, 31 July 1926, *Epling* & *Houck* 9652 (UCLA); Thatuna Hills, 6 July 1926, *Epling* & *Houck* 9187 (M, UCLA); 3000 ft. alt., 8 Aug. 1925, *Epling* & *Offord* 8777 (UCLA); 24 Aug. 1925, *Epling* & *Offord* 8775 (UCLA); Partridge Meadow, July 1929, *Epling* (UCLA); Weippe, July 1929, *Epling* (UCLA); Santa, July 1929, *Epling* (UCLA); Partridge Meadow, near Elk River, July 1929, *Epling* (UCLA).

UTAH: Deer Creek, 3 Aug. 1880, *M. E. Jones* (P); Timpanogos Peak, 21 Aug. 1889, *H. Engelmann* (M); Soldier Summit, 7300

ft. alt., 5 July 1894, *M. E. Jones 5597* (C, M, P, RM, US); American Fork Canyon, 7000 ft. alt., 15 July 1895, *M. E. Jones* (P); American Fork Canyon, 6 July 1895, *H. Jones* (S); Mendon, 17 June 1898, *Mulford 116* (M); Bear River, 7000 ft. alt., 26 July–2 Aug. 1902, *Pammel & Blackwood 4111* (G, M); Red Butte Canyon, Salt Lake Co., 22 June 1904, *Garrett 1014* (RM); north of Salt Lake City, 12 June 1905, *Rydberg 6169* (RM); Red Butte Canyon, Salt Lake Co., 12 July 1906, *Garrett 1853* (S, US); Gogorza, Summit Co., 11 Aug. 1908, *Garrett 2289* (Gar.); Paradise, Cache Co., 4 July 1909, *C. P. Smith 1742* (RM, S); Red Butte Canyon, Salt Lake City, 21 July 1909, *C. P. Smith 1901* (RM); Uinta National Forest, 7800 ft. alt., 30 July 1913, *Bowen 13* (RM); Salt Lake Co., 1920, *Garrett 540* (Gar.); Fish Lake Forest, 2360 m. alt., 29 July 1915, *C. D. Marsh 12330* (US); Aspen Grove, Wasatch Mts., 4 Aug. 1925, *Garrett 3410* (Gar.); meadow south of Soldier Summit, Utah Co., 7300 ft. alt., 19 Aug. 1929, *Garrett 5434* (Gar.).

NEVADA: Little Lake Canyon, Elko Co., *Kennedy 564* (M, RM); East Humboldt Mts., 14 July 1902, *M. E. Jones* (P); Palisade, 500 ft. alt., 17 June 1903, *Stokes* (US); Eureka, Eureka Co., 2 July 1904, *Kennedy 837* (RM); Big Creek, Lander Co., 6000 ft. alt., 26 July 1913, *Kennedy 4529* (ANSP, S); Mahoney Range station, 1911, *Garrison 37* (US); Gold Creek, 6300 ft. alt., 24 July 1912, *Nelson & Macbride 2104* (G, M, RM, US); Lone Mountain, Elko County, 7500 ft. alt., 5 Aug. 1913, *Kennedy 435* (S); Gold Creek, Elko Co., 7150 ft. alt., 7 Aug. 1913, *Kennedy 4395* (S).

WASHINGTON: 1882, *T. S. Brandegee* (C); 1883, *T. S. Brandegee 690* (ANSP); Falcon Valley, 20 July 1886, *Suksdorf* (G); Falcon Valley, 16 June 1890, *Suksdorf 2446* (G); 1889, *Vasey 223* (G, US); Yakima Co., June 1892, *Henderson 2436* (G, SCW); west Klickitat Co., 1500 ft. alt., 6 July 1892, *Suksdorf 2447* (G); Coulee City, Douglas Co., 10 July 1892, *Henderson 2433* (G, W); Union Flat, Whitman Co., 18–27 July 1892, *Hull 428* (G, SCW); Union Flat, Whitman Co., 18 July 1892, *Henderson 2437* (W); Icicle Creek, 430 m. alt., 25 July 1893, *Sandberg & Leiberg 586* (ANSP, C, CAS, F, G, M, US); Peshastin, 420 m. alt., 25 July 1893, *Leiberg 586* (O, SCW); Pullman, 5 Aug. 1893,



*Piper* 1644 (G, SCW, US, W); Pullman, 5 Aug. 1893, *Piper* 1645 (F, G, US, W); Pullman, 21 July 1894, *Piper* (US); Skamania Co., 3000 ft. alt., 21 July 1894, *Suksdorf* 2448 (G); mountain valley, Klickitat Co., 14 Sept. 1894, *Suksdorf* 2449 (G); Whitman Co., 26 July 1896, *Elmer* 321 (C, M, ND, P, US); Blue Mts., Waitsburg, 18 July 1896, *Piper* 2396 (SCW); Academy Campus, 31 May 1897, *Horner* 106 (C); Waitsburg, 31 May 1897, *Horner* 115 (US); Waitsburg, 31 May 1897, *Horner* 106B (G); Ellenburg, 14 June 1897, *Whited* 486 (M, SCW, US); Pullman, July 1897, *Elmer* 1346 (P); Cow Creek, June 1902, *Griffiths & Cotton* 534 (SCW, US); northeast Kittitas Co., 10 July 1903, *Cotton* 1330 (SCW, US); Wenatchee Mts., Kittitas Co., 21 July 1904, *Cotton* 1652 (G, SCW, US); Pullman, Whitman Co., 17 July 1919, *Ferris & Duthie* 1246 (S); Leavenworth, 3 July 1904, *Whited* 2559 (OAC); Pullman, 23 June 1925, *Eastwood*, 13151 (CAS); on road from Moscow to Pullman near Holland, 28 June 1925, *Eastwood* 13390 (CAS); Pullman, 24 June 1925, *Eastwood* 13171 (CAS).

OREGON: Clear Water, *Spalding* (G, US); Klamath Valley, 4200 ft. alt., *Cronkhite* 61 (C, US); near Corvallis, 31 May 1892, *Mulford* (M); Blue Mountains, Grant Co., 5150 ft. alt., 14 July 1896, *Coville* 578 (US); near Beulah, Malheur Co., 1080 m. alt., 17 June 1896, *Leiberg* 2300 (C, G, P, US); Swan Lake Valley, 28 June 1896, *Applegate* 58 (G, US); Lake Co., 2 Aug. 1897, *Austin* 1660 (US); Crow Creek, Wallowa Co., 4300 ft. alt., 29 June 1897, *E. P. Sheldon* 8423 (G, M, US); common in moist bottoms, 25 July 1898, *Cusick* 2165 (G); Klamath Valley, 25 June 1902, *Cusick* 2831 (C, G, M, O, P, S, US); Billy Meadows, 5000 ft. alt., 15 July 1908, *Jardine* 310 (US); Pendleton, 3 June 1910, *A. A. Heller* 10172 (ANSP, G, M, S, US); in timber, edge of Cherry Creek Camp, 23 July 1910, *Rose* 1713 (M); La Grande, 28 July 1910, *Peck* 1415 (Wil.); wet meadows, Burns, 17 June 1912, *Peck* 6860 (Wil.); Cabin Ranger district, Ochoco Forest, Blue Mountains, Crook Co., 1000 m. alt., 19-21 July 1915, *Eggleston* 11388 (US); La Zinka Ranch, 20 mi. n. Ukiah, Umatilla Co., 1000 m. alt., 23, 24 June 1916, *Eggleston* 12698, 127249 (US), Blue Mts., n. of Albee, Umatilla Co., 4000 ft. alt., 25 July 1917, *Lawrence* 818 (US); Graham Creek, vicinity of Blue

Mts. Hot Springs, Grant Co., 4 July 1919, *Ferris & Duthie 843* (S); marshes, John Day River, Prairie City, Grant Co., 1 July 1919, *Ferris & Duthie 720* (S); meadow, Keno, Klamath Co., 6 July 1920, *Peck 9331* (G, M, Wil.); De Moss Springs, Sherman Co., 29 June 1921, *Peck 13308* (Wil.); 1 mile south of Antelope, Wasco Co., 28-30 July 1922, *Abrams 9560* (S); 6 miles south of Ft. Klamath, 2-4 Aug. 1922, *Abrams 9748* (S, P); Butte Creek below Fossil, Wheeler Co., 25 June 1925, *Henderson 5402* (CAS, G, M); Austin Ranch, E. Grant Co., 21 July 1925, *Henderson 5631* (CAS, M, S, Wil.); lower flanks of Stein's Mts., Alvord Ranch, Harney Co., 8 June 1927, *Henderson 8862* (CAS, O); Belle A Ranch, near Burns, Harney Co., 22 June 1927, *Henderson 8858* (CAS); Klamath Falls, 22 June 1927, *Peck 15128* (Wil.); Dairy Creek, 35 mi. n. w. of Lakeview, 1 July 1927, *Peck 15408* (S, Wil.); near Burns, Harney Co., 13 July 1927, *Henderson 8856* (CAS, O); near Burns, Harney Co., 13 July 1927, *Henderson 8857* (CAS); marshy meadow near Beatty, 7 July 1928, *Constance 9685* (O); near Pendleton, Umatilla Co., 24 June 1927, *Gabrielson* (M); WITHOUT LOCALITY—25 July 1898, *Cusick 2165* (C, G, M, US); 1887, *Cusick 1456* (US); Pine Creek, July 1898, *Austin & Bruce 2205* (C); Bingham Springs, western Blue Mts., 7 Oct. 1908, *Cusick* (M).

CALIFORNIA: *T. S. Brandege* (C); common about Yreka, 23 June 1876, *Greene 885* (G, M); Mt. Shasta and vicinity, Siskiyou Co., 13-23 July 1892; *Palmer 2532* (C); Davis Creek, Modoc Co., Aug. 1894, *Black 67* (S); 1894, *Austin* (C); Goose Lake Valley, Aug. 1895, *Austin 417* (P); Eagle Lake, 27 miles from Susanville, 5000 ft. alt., 30 June 1897, *M. E. Jones* (P); fields, Goose Lake Valley, July 1898, *Austin & Bruce 2205* (C); near Yreka, 4 June 1909, *Butler 768* (C, P, S); dry land near Yreka, 26 May 1910, *Butler 1408* (C, P, RM, S, US); Parker Creek near Modoc National Forest Boundary, Warner Mts., Modoc Co., 15 June 1919, *Ferris & Duthie 35* (S); Parker Creek, Warner Mts., 15 June 1919, *Ferris & Duthie 154* (S); Kelseyville, Lake Co., 3 July 1924, *Blankinship* (CAS); Cedarville Road, Warner Mts., Modoc Co., 25 June 1926, *Peirson 6867* (P).

Although the type of *Sida oregana* Nutt. from "West side of Rocky Mts." was not seen, his *Sida heterophylla* seems to be

*Sidalcea campestris*, and may account for the confusion of these two Oregon species by some authors. In the absence of the type, if the original description be compared with the northern forms occurring west of the Rocky Mountains to the Willamette Valley in Oregon, the degree of pubescence ("glabrous" to "harsh puberulent," with no hirsute hairs), the elongated spiciform inflorescence, shape of calyx lobes, and size of flowers would indicate that *Sidalcea oregana* is polymorphic. Evidently the gynodioecism and gynodimorphism present is rather misleading as to flower size and color (as is true in all species that show this tendency). If it be borne in mind that the species *S. campestris*, as well as *S. virgata* of Howell, is restricted to the Willamette Valley, there seems to be little reason for confusing *S. oregana* and *S. campestris*. All those forms occurring in northern California, eastern Oregon, Idaho, Wyoming, Montana, and Nevada may be considered as the polymorphic *S. oregana*. Farther east the form of *S. nervata* A. Nelson, with a tendency toward the glabrous condition and larger and fewer flowers, seems to predominate. The more harsh form with denser but not smaller flowers is more frequent in eastern Oregon and Idaho. There is such an intergradation between the two that it seems best to treat all these as the form Nuttall had in mind in giving the locality of his *Sida oregana*.

The specimens cited by Macoun as *Sidalcea malvaeflora* var. *Oregana* Wats. acc. to Macoun are conspecific with *S. Hendersoni*.

8a. Var. *Cusickii* (Piper) Roush, n. comb.

*Sidalcea Cusickii* Piper in Proc. Biol. Soc. Wash. 29: 99. 1916.

Scabrous-puberulent throughout; inflorescence more congested than that of the species; calyx turbinate, becoming campanulate at maturity, the lobes oblong-ovate, acute (apparently slightly constricted at the base), strongly nervose and puberulent; carpels slightly reticulate with very close short meshes.

Distribution: Umpqua Valley, Oregon.

Specimens examined:

OREGON: Roseburg, Umpqua Valley, 26 June 1887, T. Howell (1100 in part) (M, ND, OAC); Umpqua Valley, 25 June 1887, T. Howell 735 (G); Looking Glass, Umpqua Valley, 27 June

1887, *T. Howell* (1101) (OAC, M, ND, US); Umpqua Valley, 20 June 1887, *T. Howell* 732 (G); Glendale, May 1887, *T. Howell* (C); Calopooya, Douglas Co., 800 ft. alt., 24 July 1899, *M. A. Barber* 80 (G); along Antelope Creek, Jackson Co., 1800 ft. alt., 4 June 1898, *Applegate* 2386 (RM); west of Crater Lake, 1 Aug. 1916, *Peck* 6867 (Wil.); Roseburg, 22 June 1916, *Peck* 6868 (Wil.); Sutherlin, Douglas Co., 19 June 1916, *Peck* 6851 (Wil.).

This variety is decidedly different from other *sidalceas* in possessing a conspicuously campanulate calyx. It shows its relationship to *S. oregana* in most characters, although in leaf condition and fruiting racemes it also resembles cultivated forms of *S. campestris*.

9. *S. campestris* Greene in Bull. Calif. Acad. Sci. 1: 76. 1885; Gray in Proc. Am. Acad. 22: 286. 1887; E. G. Baker in Jour. Bot. 29: 52. 1891 (Synopsis Malveae, 29. 1894); Gray, Syn. Fl. N. Am. 1: 305. 1897; Howell, Fl. N. W. Am. 102. 1897; Piper & Beattie, Fl. N. W. Coast, 238. 1915; Gilkey, Spring Fl. N. W. Oregon, 88. 1929. Pl. 8, fig. 2.

*Sida malvaeflora* Lindl. in Bot. Reg. 12: 1036, pl. 1036. 1826; Torr. & Gray, Fl. N. Am. 234. 1838, not of DC.; Hook. Fl. Bor.-Am. 1: 108. 1840, not of DC.

*Sidalcea oregana* Gray in Mem. Am. Acad. N. S. 4: 20. 1849 (Pl. Fendl. 20. 1849), in part.

*S. asplenifolia* Greene in Pittonia 3: 158. 1897.

*S. sylvestris* A. Nels. in Proc. Biol. Soc. Wash. 20: 36. 1907.

Perennial from a woody root; stem erect, up to 18 dm. high, slender, or slightly branched, usually bristly hirsute with mostly two-rayed hairs, up to the inflorescence; basal leaves orbicular, 7-9-lobed, lobes 2-5-dentate at apex; hairs of the upper surface simple or geminate and appressed, those of the lower surface geminate or multiradiate, dense but not harsh or only slightly so; petioles up to 2 dm. long, retrorsely hirsute; middle cauline leaves up to 2.5 dm. broad, palmately parted almost to the base into 7-9 linear or somewhat cuneate coarsely serrate-pinnatifid segments; upper cauline leaves almost completely parted into 3-5-7 linear, entire or slightly dentate segments, either glabrescent or with few hairs on the veins on the lower surface, and

ciliate; inflorescence loosely racemose, 1-3.5 dm. long, long-pedicellate, cinereous stellate-pubescent throughout, generally hirsute also; bracts narrow, bifid and densely stellate; calyx-lobes often dull purplish, ovate-lanceolate, densely stellate, with long hairs at least on the margins; petals pale rose or whitish, about one-half smaller in the pistillate flowers than in the perfect flowers; carpels rugose or favosely reticulate, retaining their pubescence until almost mature.

Distribution: Willamette Valley, Oregon.

Specimens examined:

OREGON: Columbia River, *Nuttall* (ANSP); *Nuttall* (G); 1826 (?), *Douglas* (G probably authentic material of *Sida malvaeflora* Lindl.); Oregon City, 1868-9, *Kellogg & Harford* 109 (G); Washington Co., July 1877, *T. Howell* (M); dry prairies, July 1880, *Eggert* (M); dry prairies, July 1881, *T. Howell* 614 (G COTYPE, US); dry prairies, July 1881, *T. Howell* (US); Hood River, 26 June 1882, *Henderson* 24 (G); Hood River, Wasco Co., July 1883, *Henderson* 12 (G); Tualatin plains, July 1883, *Henderson* 13 (G); Tualatin plains, July 1886, *Henderson* 25 (G); Salem, 9 July 1887, *Henderson* 150 (OAC, S); near Portland, 28 June 1888, *Henderson* (O); McMinnville, 20 July 1899, *Shear* 5622 (US); Hillsboro, May 1889, *Gorman* (F, W); near Milwaukie, Multnomah Co., 15 July 1893, *Suksdorf* 2216 (G); Gladstone, July 1894, *T. Howell* 1492 (C, M, SCW, US); Corvallis, 29 June 1894, *Finley* (OAC); Corvallis, 26 May 1898, *Kincaid* (SCW); Portland, 13 July 1902, *E. P. Sheldon* 10872 (G, M, O, P, SCW, US); along Willamette River, Wheatland, Yamhill Co., 17 July 1903, *Lunell* (RM); Portland, 7 July 1903, *Lunell* (US); Wheatland, Yamhill Co., 8 July 1903, *Lunell* (RM Herb. No. 52562 TYPE of *S. sylvestris* A. Nels.); Salem, 21 April 1910, *Peck* 6873 (Wil.); Salem, May 1911, *Peck* 6872 (Wil.); Salem, June 1911, *Peck* 6874 (Wil.); Salem, Aug. 1911, *Peck* 6862 (Wil.); 1 mile north of Corvallis, 17 June 1912, *Walls & Owens* (OAC); near Gresham, near Portland, 11 July 1912, *Suksdorf* 1877 (G); hills west of Salem, May 1913, *Peck* 6855 (Wil.); hills west of Salem, May 1913, *Peck* 6856 (W); Corvallis, 26 June 1913, *Gilbert* 877 (OAC); Crabtree, 1915, *Hatch* (OAC); Salem, 16 May 1916, *J. C. Nelson* 584, 585 (S); Salem, 7 June 1916, *J. C. Nelson* 658 (S);



Salem, 12 June 1917, *J. C. Nelson 1302* (G); Portland, 29 June 1917, *Gorman 4124* (S); near Corvallis, 12 April 1919, 235 ft. alt., *Luedinghaus* (M); north of Corvallis, 240 ft. alt., July 1920, *Steward 173* (OAC); Salem, 22 July 1920, *M. S. Clemens* (CAS, US); Bush's pasture, Salem, 19 May 1921, *J. C. Nelson 3651* (ANSP); Goshen, Lane Co., 5 July 1922, *Abrams 8716* (P, S); near Albany, 8 July 1923, *Phelps* (CAS); David's Hill, Forest Grove, Washington Co., 15 April 1926, *J. W. Thompson 582* (M); meadows on the Lorane Road, 5 or 6 miles from Eugene, 9 June–18 July 1926, *Henderson* (O); near Alsea, Benton Co., 25 July 1929, *Henderson 11356* (O); Salem, *Reynolds 8988* (Wil.).

Although at first confused with *Sidalcea oregana* and *S. malvaeflora* (especially in name), this species may be separated from all others by its usually hirsute pubescence (except when grown in dense shade), by the pinnatifid segments of the leaves (or long narrow divisions of the uppermost ones), the lax inflorescence with its long pedicels, the pale rose or almost white flowers with dark-tipped calyx, and by its distribution being limited to the Willamette Valley, Oregon. The leaves are yellow-green, thin, softly pubescent, or slightly harsh on the lower surface.

This is without doubt the *Sida malvaeflora* of Lindley,<sup>24</sup> not of DC., although the plant illustrated by Lindley is more like the *Sidalcea asplenifolia* form than the true *S. campestris* of Greene. This could be expected since both seem to have been founded on cultivated forms. The plant of Lindley was introduced by David Douglas from the "Multomah" (Multnomah) region of northern Oregon.

*Sidalcea asplenifolia* Greene is reported<sup>25</sup> as probably introduced in grass seed in the meadows near Seattle where Piper collected and cultivated it. Most of the specimens distributed under *Piper No. 242* were evidently cultivated, according to a note by him on one of the herbarium sheets. These have extremely large leaves with coarsely serrate-pinnatifid segments and a much elongate, more rigidly erect raceme with smaller flowers and less hirsuteness.

*Sidalcea sylvestris* Nelson, collected in dense shade of wood-

<sup>24</sup> Lindl. in Bot. Reg. 12: 1036, pl. 1036. 1826.

<sup>25</sup> Piper & Beattie, Fl. N. W. Coast, 238. 1915.

lands near Wheatland, Yamhill Co., Oregon, is almost glabrous, and a much-attenuated shade form of the species. The lower leaves are not present, but the uppermost cauline leaves are not unlike those of the type of *S. campestris*.

10. *S. virgata* Howell, Fl. N. W. Am. 101. 1897; Piper & Beattie, Fl. N. W. Coast, 239. 1915; Gilkey, Spring Fl. N. W. Oregon, 88. 1929.

Perennial from a woody root, softly stellate-pubescent throughout (rarely glabrescent); stems one or several, up to 6 dm. high, mostly simple, decumbent (rarely rooting) at base; leaves orbicular or semi-orbicular, densely stellate-pubescent on the lower surface with more simple appressed hairs on the upper surface; basal leaves orbicular, small, slightly lobed, lobes coarsely dentate; middle cauline leaves more or less deeply palmately cleft into 5-7 oblong, coarsely dentate segments; upper cauline leaves deeply cleft, segments entire; inflorescence 1-several loose virgate racemes; rachis, bracts, pedicels, and calyx mostly densely stellate-pubescent; bracts subulate or slightly bidentate, long, often equalling the pedicels, slender; calyx-lobes green or purple-tinged, lanceolate, acuminate; petals bright purple, emarginate, large in the perfect flowers; carpels reticulate with fine short meshes.

Distribution: common on dry hillsides in the Willamette Valley, near Silverton, Corvallis, and Eugene, Oregon.

Specimens examined:

OREGON: 1871 (?), *E. Hall* 71 in part (G); Oregon Experiment Station, 21 May 1899, *H. Spencer* 2 (OAC); Silverton, June 1882, *T. Howell* 680 (US probably authentic material); July to May 1896, Oregon Experiment Station (OAC); Marys River, 13 May 1899, *Getty* (OAC); Corvallis, 5 July 1911, *Griffin* (OAC); near Dallas, 12 May 1911, *Peck* 6866 (Wil.); near Salem, 31 May 1913, *Peck* 6877 (Wil.); near south College Farm, Corvallis, 14 April 1915, *Yates* (OAC); south of Corvallis, 22 May 1916, *Gilbert* 874 (OAC); near Silverton, 11 May 1918, *J. C. Nelson* 2122 (G); foothills of Cascades, east of Brownsville, 18 June 1918, *Lawrence* 1719 (US); Crystal Lake Cemetery, 7 May 1918, *Gilkey* 59 (OAC); Skinner's Butte, Eugene, 8 May 1920, *Brad-*

*shaw 1496* (S); border of street, Silverton, 14 May 1921, *J. C. Nelson 3640* (ANSP); dry open hillside, Silverton, 14 May 1921, *J. C. Nelson 3612* (ANSP); Corvallis, 24 May 1922, *Epling 5322* (UCLA); Corvallis, May 1922, *Epling 5611* (UCLA).

This species is very closely related to *S. campestris* but distinct because of the shorter stature and stellate tomentum, leaf form, and usually virgate habit. The leaves and pubescence are much like those of *S. asprella*, but the inflorescence is entirely distinct. It is a species suitable for cultivation.

11. *S. neo-mexicana* Gray in Mem. Am. Acad. N. S. 4: 23. 1849 (Pl. Fendl. 23. 1849); Walp. Ann. 2: 151. 1851-52; Hemsl. Biol. Cent.-Am. Bot. 1: 99. 1879; Gray in Proc. Am. Acad. 22: 287. 1887; E. G. Baker in Jour. Bot. 29: 52. 1891 (Synopsis Malveae, 31. 1894); Coulter in Contr. U. S. Nat. Herb. 2: 37. 1891; Gray, Syn. Fl. N. Am. 1: 306. 1897; Nelson in Coulter & Nelson, Man. Bot. Cent. Rocky Mt. 317. 1909. Hubbard in Bailey, Stand. Cyc. Hort. 6: 3162. 1917; Rydb. Fl. Rocky Mts. 559. 1917, and ed. 2. 559. 1922.

*S. malvaeflora* Gray in Smiths. Contr. 3: 16. 1852 (Pl. Wright. 1: 16. 1852), mainly, excl. syn. *Sida malvaeflora*; *ibid.* 5: 20. 1852 (Pl. Wright. 2: 20. 1852); Walp. Ann. 4: 309. 1857, as to synonymy *S. neo-mexicana*; Wats. Bot. King Exp. 46. 1871, mainly, excluding large-flowered form and varieties; Porter & Coulter, Syn. Fl. Colo. 15. 1874; Brew. & Wats. Bot. Calif. 1: 83. 1876, in part; Hemsl. Biol. Cent.-Am. Bot. 1: 99. 1879; Greene in Bull. Calif. Acad. Sci. 1: 75. 1885; Coulter, Man. Bot. Rocky Mt. 41. 1885; Greene, Fl. Francis. 105. 1891, as to description and synonymy *S. neo-mexicana*.

*S. parviflora* Greene var. *Thurberi* Rob. in Gray, Syn. Fl. N. Am. 1: 305. 1897.

*S. crenulata* A. Nels. in Proc. Biol. Soc. Wash. 17: 93. 1904; Rydb. Fl. Rocky Mts. 559. 1917, and ed. 2. 559. 1922.

*S. neo-mexicana* Gray var. *Diehlii* Jones, Contr. West. Bot. 12: 4. 1908.

*S. confinis* Greene, Cyb. Columb. 1: 35. 1914.

Perennial from a strong woody fusiform root; stems one to several, simple or much branched, erect or slightly decumbent at

base, 1-9.5 dm. high, hirsute or nearly glabrous (Mexican plants with some few-rayed hairs); leaves with somewhat appressed, simple or few-rayed hairs on both surfaces, ciliate; basal leaves orbicular, 1-6 cm. broad, merely crenate or slightly 5-9-lobed, the lobes crenate or coarsely dentate, sinus open; middle cauline leaves deeply 5-9-parted into 3-5-lobed segments; upper cauline leaves parted almost to the base into 3-5 linear entire segments; stipules lanceolate, ciliate; inflorescence a close many-flowered raceme, elongating after anthesis; rhachis glabrous, or with few simple or few-rayed hairs; bracts 0.5-1 cm. long, deeply bifid or trifid, appearing membranous (whitish opaque or bluish green in color, especially before anthesis), ciliate; pedicels and calyx more or less hirsute, rarely with some stellate hairs (Mexican plants); pedicels strict, after anthesis much longer than the calyx; calyx-lobes deltoid-ovate, acute or acuminate; petals purple, rarely white, about 1.5 cm. long; carpels glabrescent, smooth or slightly reticulate.

Distribution: in moist meadows in the mountains from Wyoming and Idaho south to the states of Coahuila and Durango, Mexico.

Specimens examined:

WYOMING: Cummins, 28 July 1895, *A. Nelson 1463* (CAS, G, M, US); Indian Grove Mts., 17 July 1898, *E. Nelson 4892* (P); Elk Mt., 16 July 1899, *Little & Stanton (Pammel 168)* (M); Encampment, Carbon Co., 10 July 1901, *Tweedy 4570* (US); Slater, Carbon Co., 31 July 1903, *Goodding 1747* (C, G, M, US); Jelm, Albany Co., 8 Aug. 1907, *A. Nelson 9069* (G, M).

COLORADO: Middle Park, Aug. 1862, *Parry 430* (G, M, US); Rocky Mts., 1862, *Hall & Harbour 18* (F, G); Rocky Mts., 1864, *Parry* (ANSP, US); Musca Pass, Aug. 1867, *Parry 24* (G); North Park, Aug. 1868, *Hayden* (US); South Park, Aug. 1871, *Meehan* (ANSP); Valley of the Upper Arkansas, Trout Creek, Sept. 1873, *Wolf & Rothrock 14* (ANSP, F, US); Grape Creek, 23 June 1873, *T. S. Brandegee 793* (ANSP, C, M); Pleasant Valley, 23 Sept. 1878, *M. E. Jones* (P, S); Middle Park, 2 Aug. 1881, *G. Engelmann* (M); Wagon Wheel Gap, 16 July 1882, *B. H. Smith* (ANSP); Gunnison, July 1888, *Eastwood 13* (US); Table Rock, 7500 ft. alt., 19 July 1891, *Breninger* (M); Steamboat Springs, Sept. 1891,

*Trelease* (M); Steamboat Springs, July 1891, *Eastwood* (F, G); Hotchkiss, Delta Co., 5200 ft. alt., 23 June 1892, *Cowen* 82 (US); Buena Vista, 8000 ft. alt., 5 July 1892, *Sheldon* 367 (US); Middle Park, 25 July 1892, *Beardslee* 102 (US); Middle Park, Aug. 1892, *Beardslee* (W); North Park, 9000 ft. alt., 9 July 1894, *Crandall* 108 (G, SCW); La Veta, 14 July 1896, *Shear* 3551 (US); North Park, 19 July 1896, *C. F. Baker* (C); on Grizzly Creek, 8000 ft. alt., 19 July 1896, *C. F. Baker* (M); Durango, 7000 ft. alt., 25 July 1896, *Tweedy* 554 (US); Sargent, 27 July 1896, *Shear* 5136 (US); Conejos River near Antonito, 7880 ft. alt., 24 June 1898, *Crandall* (US); Durango, 26 July 1898, *Baker, Earle & Tracy* 887 (P); Piedra, 12 July 1899, *C. F. Baker* 461 (F, G, M, ND, P, US); Ruxton Park, Pike's Peak Trail, Aug. 1900, *Harper & Harper* (M); Gunnison, 7680 ft. alt., 7 July 1901, *C. F. Baker* 360 (C, G, M, P, US); Cimarron, 6900 ft. alt., 13 July 1901, *C. F. Baker* 440 (C, G, M, ND, P, US); North Elk Canyon, Rio Blanco Co., 12 Aug. 1902, *Sturgis* (CAS, G, S); Steamboat Springs, Routt Co., 20 July 1903, *Goodding* 1627 (ANSP, C, G, M, S, US); 10 miles east of Bayfield, 12 Aug. 1904, *Wootton* 2671 (US); Mt. Whiteley, 16 July 1905, *Cary* 12 (US); Gunnison, 1910, *Evermann* (US); Wagon Wheel Gap, 8400 ft. alt., 15 July 1911, *Murdoch* 4756 (F, M, OAC, P); Ortiz, 2400 m. alt., 12 July 1910, *Eggleston* 5943 (US); Iron Springs Mesa, San Miguel Co., 7500 ft. alt., 21 Aug. 1912, *E. P. Walker* 515 (G, M, P, US); Pitkins, 9200 ft. alt., 12 Sept. 1917, *Clokey* 2995 (CAS, F); east of Gunnison, 29 June 1927, *Osterhout* (P).

NEW MEXICO: 1847, *Fendler* 79 (ANSP, F, G TYPE, M, US); from western Texas to El Paso, May-Oct. 1849, *Wright* 39 (G); Las Playas, June 1851, *Thurber* 334, 340 (G TYPE of *S. parviflora* var. *Thurberi* Rob., M); Ojo de Gavilan, Aug. 1851, *Thurber* 1664 (G); Rio Laguna, 26 Aug. 1851, *Woodhouse* (ANSP); along the Mimbres, Aug.-Sept. 1851, *Wright* 880 (ANSP, C, G, M, US); Ford of Chama, 29 July 1859, *Newberry* (US); Las Vegas, July 1881, *Vasey* (US); Mangas Springs, 15 Oct. 1881, *Rusby* 47 (F, G, US); mts. west of Grant's Station, 2 Aug. 1892, *Wootton* (US); Monument No. 40, Mex. boundary line, 15 May 1892, *Mearns* 265 (US); Mesquite Spring (Mexico?), 16 May 1892, *Mearns* 72 (US TYPE of *S. confinis* Greene, S); Fort Bayard, 25 July 1895,



*Mulford 436* (M); Roger's Ranch, 25 July 1895, *Mulford 436a* (M); Mr. Hick's Ranch, 20 July 1895, *Mulford 360* (M); Comanche Valley, 8000 ft. alt., July 1896, *Mrs. H. St. John* (G); along Tularosa Creek, Otero Co., 29 July 1897, *Wooton* (US); White Mountains, Lincoln Co., 5400 ft. alt., 22 July 1897, *Wooton 192* (C, G, M, ND, P, S, US); Chama, 18 July 1898, *Earle* (M); Silver Springs Cañon, Otero Co., 6 July 1899, *Wooton* (M, US); Middle Fork of the Gila, Mogollon Mountains, Socorro Co., 5 Aug. 1900, *Wooton* (US); West Fork of the Gila, Mogollon Mountains, Socorro Co., 6 Aug. 1900, *Wooton* (US); Crain's Ranch, 14 July 1900, *Wooton* (US); Mogollon Mountains, on or near the west fork of the Gila River, Socorro Co., 7500 ft. alt., 4 Aug. 1903, *Metcalf 366* (G, M, P, US); near Chama, 15 Aug. 1904, *Wooton* (US); Kingston, Sierra Co., 6600 ft. alt., 9 July 1904, *Metcalf 1091* (M, US); Fort Bayard Watershed, Grant Co., 22 Oct. 1905, *Blumer 119* (G, US); Wheeler's Ranch, 11 July 1906, *Wooton* (C, P, S, US); Pecos River National Forest, 6700 ft. alt., 15 Aug. 1908, *Standley 4966* (G, M, US); along the river, vicinity of Chama, Rio Arriba Co., alt. 2380-2850 m., 8 July 1911, *Standley 6587* (US); Jicarilla Apache Reservation, near Dulce, 2150-2470 m. alt., 20 Aug. 1911, *Standley 8242* (US); Balsam Park, Sandia Mountains, 8200 ft. alt., July-Aug. 1914, *Ellis 244* (M, US); vicinity of Brazos Canyon, Rio Arriba Co., 1 Sept. 1914, *Standley & Bollman 11040* (US); vicinity of Ute Park, Colfax Co., 2200-2900 m. alt., 27 Aug. 1916, *Standley 13872* (US); Las Vegas, San Miguel 7 miles n., 2050 m. alt., 19 July 1927, *Arsène 18632* (P); Las Vegas 6 miles sud., 1880 m. alt., 28 June 1927, *Arsène 18879* (P).

ARIZONA: Fort Whipple, 1864, *Coues & Palmer* (M); Skull Valley, 4 June 1865, *Coues & Palmer 221* (M); without locality, 1869, *Palmer* (US); moist cañon, 21 July 1896, *Fernow* (US); Huachuca Mts., Sept. 1882, *Lemmon 2646* (C, G); base San Francisco Mts., Aug. 1884, *Lemmon & Lemmon* (C, US); Flagstaff, 5 Aug. 1884, *M. E. Jones 3993* (C, F, P, US); near Flagstaff, 13 July 1889, *Greene* (ND); Johnson, 20 June 1890, *M. E. Jones* (P); Mormon Lake, 10-20 July 1892, *Toumey 80* (C, S, US); San Francisco Mts., 15 July 1892, *Wooton* (US); Prescott, 4 Aug. 1896, *Zuck* (US); vicinity of Flagstaff, 7000 ft. alt., 8 July

1898, *MacDougal* 248 (ANSP, C, F, G, US); near Leroux Spring, San Francisco Mts., Forest Reserve, 2200 m. alt., 12 Aug. 1901, *Leiberg* 5843 (US); White Mts., 11-15 Aug. 1903, *Griffiths* 5259 (M); Coconino National Forest and vicinity, 7250 ft. alt., 8 Sept. 1909, *Pearson* 279 (US); Thompson's Ranch, Black River, White Mts., 11 July 1910, *Goodding* 527 (G, US); Thompson's Ranch, Black River, 13 July 1910, *Goodding* 570 (G); Flagstaff, 7-11 Aug. 1915, *A. E. Hitchcock* (US); Williams, 22 June 1916, *Eastwood* 5919 (CAS, G); 3 miles east of Cooley's Ranch, Apache Indian Reservation, 6 July 1918, *Ferris* 1279 (S); Riverside Ranger Station, Greer, Apache Forest, Apache Co., 2700 m. alt., 23 Aug. 1920, *Eggleston* 17095 (M); valley near Flagstaff, 7000 ft. alt., 28 July 1922, *Hanson* 241 (F, M, OAC, P); mountains near Phoenix, 1926, *Norville* (M); about 20 miles south of Prescott, 8 July 1926, *Peebles, Harrison & Kearney* 2610 (US); Prescott, 1 June 1927, *Peebles & Harrison* 4192 (US); near Prescott, 17 July 1927, *Peebles, Harrison & Kearney* 4314 (US); Ryan Ranch, Apache Reservation, 2 Oct. 1927, *Harrison* 4861 (C, US).

IDAHO: American Falls, Oneida Co., 3000 ft. alt., 28 July 1911, *Nelson & Macbride* 1386 (C, G, M, P, RM, S, US).

UTAH: *Fremont's 2nd Expedition* (US); southern Utah, 1874, *Parry* (M); 1877, *Palmer* 61 (M); Springville, 26 June 1880, *M. E. Jones* (P); Salt Lake City, 23 June 1883, *Leonard* (G); Deep Creek, 28 July 1891, *M. E. Jones* (P); Fairview, 6000 ft. alt., 13 June 1894, *M. E. Jones* 5627a (P, US); Marysvale, 6500 ft. alt., 1 Aug. 1894, *M. E. Jones* 5976b (P, US); Kingston, 6500 ft. alt., 3 Sept. 1894, *M. E. Jones* 5983a (P, US); Juab, 10 June 1902, *Goodding* 1091 (C, F, G, M, P, RM TYPE of *S. crenulata* Nels., US); Wasatch Co., near Midway, 6 July 1905, *Carlton & Garrett* 6694 (RM, US); Hills Park, 29 June 1908, *Mrs. Joseph Clemens* (ANSP, F, G, M, S); Summit Co., 11 Aug. 1908, *Garrett* 2303a (Gar.); mesa east of Monticello, 2100 m. alt., 25 July 1911, *Rydberg & Garrett* 9211 (Gar., US); Montezuma Canyon, east of Monticello, 2000 m. alt., 13 Aug. 1911, *Rydberg & Garrett* 9680 (G); Toole Co., 17 June 1914, *Garrett* 2762 (G); Parley's Canyon, Salt Lake Co., 29 June 1915, *Garrett* 2803a (Gar.); near Garfield, Salt Lake Co., 16 June 1915, *Garrett* 2793 (Gar., RM); Antelope Island, Great Salt Lake, Salt Lake Co., 4250 ft. alt.,

11 June 1916, *Garrett 2820* (Gar.); Murray, Salt Lake Co., 23 July 1917, *W. W. Jones 412* (G); north of Salt Lake City, Salt Lake Co., 12 June 1926, *Garrett 3501c* (RM); Wasatch Co., 8 Aug. 1928, *Garrett* (Gar.).

NEVADA: Wells, 5700 ft. alt., 9 Aug. 1881, *M. E. Jones 2182* (C, CAS, P, S); pasture at Simon's Creek, Elko Co., 15 Aug. 1902, *Kennedy 673* (RM); Stampede, Elko Co., Aug. 1903, *Kennedy 811* (RM); Deeth, Elko Co., 5340 ft. alt., 17 July 1908, *A. A. Heller 9016* (ANSP, M, US); Italian Ranch, N. C. Railroad, Reese River Valley, Lander Co., 6000 ft. alt., 22-25 July 1913, *Kennedy 4126* (ANSP, M, US); between Battle Mountain and Austin, 1950 m. alt., 25 July 1913, *A. E. Hitchcock 696* (US); Park's Station, 25 miles north of Elko, 1950 m. alt., 3 Aug. 1913, *A. E. Hitchcock 981* (US); Duck Creek, Paine's Ranch, Ely, 17 Aug. 1913, *A. E. Hitchcock 1356½* (US).

MEXICO:

CHIHUAHUA: fifteen miles south of Guadalupe y Calvo, 7500-8000 ft. alt., Aug. 1898, *E. W. Nelson 4823* (US); Sierra Madre, near Guachochi, 27 Sept. 1898, *Goldman 176* (G, US); Sierra Madre near Colonia Garcia, 8000 ft. alt., 25 June 1899, *Townsend & Barber 55* (C, F, G, M, US); Sierra Madre, 21 June-29 July 1899, *E. W. Nelson 6044* (US); Round Valley, Sierra Madre Mts., 17 Sept. 1903, *M. E. Jones* (CAS, P TYPE of *S. neo-mexicana* var. *Diehl* Jones, S, US); vicinity of Madera, 2250 m. alt., 27 May-3 June 1908, *Palmer 310* (US); vicinity of Chihuahua, 1300 m. alt., 8-27 April 1908, *Palmer 64* (F, M, US).

DURANGO: City of Durango and vicinity, April-Nov. 1896, *Palmer 117* (C, F, G, M, US); near El Salto, 12 July 1898, *E. W. Nelson 4543* (US); *P. Ibana Garcia 321* (US).

NUEVO LEON (?): marsh of San Juan de la Vaqueria, 20 May 1847, *Gregg 718* (G, M).

COAHUILA: Buena Vista, near Saltillo, 24 July 1848, *Gregg 291* (G, M); Saltillo and vicinity, May 1898, *Palmer 132* (C, G, M, US).

This species was formerly confused with *Sidalcea malvaeflora* as to name, and horticultural forms of *S. neo-mexicana* are sold under the name *S. malvaeflora* at present. The geographical distribution clearly indicates this species as having the widest

range of any within the group, reaching Montana on the north, western Texas on the east, and the States of Nuevo Leon and Durango, Mexico, on the south. Dr. Gray made use of this in connection with specific characters in finally separating *S. malvaeflora* into the coastal species retaining the name *S. malvaeflora*, and the two inland species *S. neo-mexicana* with the range just given, and *S. oregana* for the more northern forms ("West side of the Rocky Mountains," Nuttall).

*Sidalcea parviflora* var. *Thurberi* Rob.<sup>26</sup> (locality given as Las Playas, Sonora, Mexico), doubtless from Las Playas,<sup>27</sup> New Mexico, near the United States-Mexican border, is a low, small-leaved form found in alkaline soil and yet not sufficiently unlike other small forms to be given varietal rank. Though resembling in some degree the plant designated as *S. parviflora* by Greene, it is more nearly related to *S. neo-mexicana*.

*Sidalcea crenulata* A. Nelson, from Juab, Utah, Goodding No. 1091, has more stellate pubescence in the inflorescence (thus simulating some Mexican forms) than most of the group but otherwise does not differ from typical *S. neo-mexicana*.

*Sidalcea neo-mexicana* var. *Diehlii* M. E. Jones is typical of the taller Mexican forms, most of which have a greater degree of hirsute pubescence, and larger, more conspicuous bracts than the more northern forms. The collection of Townsend & Barber No. 55, from Chihuahua, shows this character in striking contrast to Palmer No. 64, from Chihuahua, which is smaller, less hirsute or merely stellate-pubescent, and with lighter-colored flowers.

*Sidalcea confinis* Greene was based on a very much reduced plant from Mesquite Spring,<sup>28</sup> Mexico (near Monument 46, now New Mexico), 16 May 1892, Mearns No. 72. One other specimen collected near Monument no. 40<sup>28</sup> (Mexican Boundary line), 15 May 1892, Mearns No. 265, is identical. Monument no. 40 is just south of the Big Hatchet Mountains, New Mexico, and these plants from alkaline soils resemble those from Las Playas not far distant. Due to the alkalinity of that area they are much

<sup>26</sup> Robinson in Gray, Syn. Fl. N. Am. 1: 305. 1897.

<sup>27</sup> Wootton in Bull. Torr. Bot. Club 33: 561-566. 1906; Standley in Contr. U. S. Nat. Herb. 13: 143. 1910.

<sup>28</sup> Rept. U. S. & Mex. Bound. Com. (Sen. Doc. 247) 2: 17. 1898.

reduced, whitish, less hirsute, and have much smaller bracts than the montane forms.

11a. Var. *parviflora* (Greene) Roush, n. comb.

*S. parviflora* Greene in *Erythea* 1: 148. 1893; Gray, *Syn. Fl. N. Am.* 1<sup>1</sup>: 305. 1897; Abrams, *Fl. Los Angeles & Vicinity*, 248. 1904; Davidson & Moxley, *Fl. So. Calif.* 231. 1923; Jepson, *Man. Fl. Pl. Calif.* 631. 1925.

*S. nitrophila* Parish in *Erythea* 7: 93. 1899; Davidson & Moxley, *Fl. So. Calif.* 231. 1923.

More or less glabrous and glaucous throughout; stems several, slender; leaves thick, with few, simple, geminate, or few-rayed hairs on the veins of the lower surface, sparse on the upper surface; inflorescence racemose, elongating in anthesis; bracts less conspicuous than in the species; pedicels and calyx somewhat stellate-pubescent; carpels dorso-laterally reticulate.

Distribution: in brackish and subalkaline marshes of Kern, San Bernardino, Orange, and Los Angeles Counties, California.

Specimens examined:

CALIFORNIA: SAN BERNARDINO COUNTY—San Bernardino, April 1885, *Parish & Parish 1747* (G); San Bernardino, May 1886, *Parish & Parish 1747* (US); Rabbit Springs, Mohave Desert, May 1886, *S. B. Parish 1804* (G, ND COTYPE of *S. nitrophila* Parish, S); meadows, 15 May 1889, *S. B. Parish 2080* (G TYPE, M, ND); alkaline soil, ——— Ranch, May 1891, *S. B. Parish* (S); meadows, San Bernardino, May 1891, *S. B. Parish* (P); meadows near San Bernardino, 10 June 1891, *S. B. Parish 2199* (ND, US); vicinity of San Bernardino, 1000–1500 ft. alt., 1 May 1895, *S. B. Parish 3639* (C, CAS, G, M, ND, SCW, US); San Bernardino, 30 April 1896, *Cummings* (G); vicinity of San Bernardino, 1000–2500 ft. alt., April 1899, *S. B. Parish* (P); vicinity of San Bernardino, 1000 ft. alt., 22 April 1901, *S. B. Parish 4687* (S); Rabbit Springs, Mohave Desert, 1 June 1901, *S. B. Parish 4854* (ANSP, C, P, S, US); Chino, 700 ft. alt., 26 April 1902, *Kellogg* (P); Chino Creek, south of Ontario, 500 ft. alt., 30 May 1917, *Johnston 1127* (P, S, US); Rabbit Springs, 24 April 1915, *S. B. Parish 9823* (C, S); Twenty-nine Palms, 3000 ft. alt., 1 May 1921, *Munz 4516* (P); San Bernardino Mts.,



June 1928, *Van Dyke* (CAS); LOS ANGELES COUNTY—Antelope Valley, 1884, *Oliver* (G); Elizabeth Lake, June 1887, *S. B. Parish* 1956 (ND, S); Santa Monica, 1890, *Hasse* (C); near Santa Monica, 1891, *Hasse* (C, ND, US); Santa Monica, June 1892, *Hasse* (C); Claremont, 12 June 1909, *Pruett* 67 (P); ORANGE COUNTY—between Tustin and Myford, 17 April 1903, *Abrams* 3257 & 3257a (ANSP, C, G, M, ND, P, S, US); KERN COUNTY—Posa Creek, Sept. 1853, *Heermann* (US); Fort Tejon and vicinity, 1857-8, *Vesey* 15 in part (US); near Rosamond, 15 May 1896, *Davy* 2255 (G); near Fort Tejon, 26 May 1896, *Davy* 2336 (C); Costac Lake, Tejon Pass, 12 June 1896, *Dudley & Lamb* 4450 (P, S, US).

Dr. Greene referred this group to *Sidalcea neo-mexicana* until he found "*S. glaucescens*" written on the sheets from Parish's herbarium. He then described it as *S. parviflora* and related it to the inland species *S. malvaeflora* (now *S. neo-mexicana*). The habit, with leaves mostly basal, sparse hirsute hairs, elongate inflorescence, long pedicels, and membranous bracts, warrants maintaining it as a variety of the inland species, connecting that species with the *S. malvaeflora* of the coast. The subalkaline or subsaline (brackish) habitat may account for the reduced leaf surface, the sparse pubescence, and the smaller bracts. Forms cultivated from the seed of plants collected by Hasse in the Los Angeles vicinity resemble closely the Rocky Mountain forms of the species, especially *Rusby* No. 47 from Mangas Springs, New Mexico.

11b. Var. *Covillei* (Greene) Roush, n. comb.

*S. Covillei* Greene, in *Cyb. Columb.* 1: 35. 1914.

Sparsely stellate-pubescent throughout; stems erect, several; leaves mostly basal, slightly to deeply cleft into short, obovate, crenate or dentate lobes; inflorescence an elongate raceme; bracts not conspicuous; carpels reticulate with short meshes.

Distribution: western part of Inyo County, California.

Specimens examined:

CALIFORNIA: INYO COUNTY—about 1 mile north of Lone Pine, 1125 m. alt., 14 June 1891, *Coville & Funston* 954 (US); Hawee meadows, 20 June 1891, *Coville & Funston* 1004 (US TYPE);

Lone Pine, 6000 ft. alt., 14 May 1897, *M. E. Jones* (M, P, S, US); near Bishop, 17 June 1927, *M. E. Jones* (CP, P).

This variety differs from var. *parviflora* chiefly in the presence of stellate hairs which may be a response to its habitat in this arid region.

12. *S. malvaeflora* (DC.) Gray in Benth. Pl. Hartw. 300. 1848; in Smiths. Contr. 3: 16. 1852 (Pl. Wright. 1: 16. 1852), at least as to name carrying synonymy; Wats. Bot. King Exp. 46. 1871, as to name and synonymy only; Brew. & Wats. Bot. Calif. 1: 83. 1876, as to synonym *Sida malvaeflora* DC.; Gray in Proc. Am. Acad. 21: 409. 1886; *ibid.* 22: 286. 1887, not of earlier publications except as to synonym *Sida malvaeflora* DC.; Greene, Fl. Francis. 105. 1891, in part; E. G. Baker in Jour. Bot. 29: 52. 1891 (Synopsis Malveae, 30. 1894); Gray, Syn. Fl. N. Am. 1: 304. 1897; Howell, Fl. N. W. Am. 101. 1897, name only; Jepson, Fl. West. Mid. Calif. 239. 1901, in part, and ed. 2. 258. 1911; Abrams, Fl. Los Angeles & Vicinity, 247. 1904; Hubbard in Bailey, Stand. Cyc. Hort. 6: 3162. 1917, name only; Jepson, Man. Fl. Pl. Calif. 628. 1925.

Pl. 5, figs. 1 & 2; pl. 11.

*Sida malvaeflora* DC. Prod. 1: 474. 1824 (Mocino & Sesse, Fl. Mex. Ic. ined., and Calques des Dess. pl. 70, doubtless collected at Monterey, California); Torr. & Gray, Fl. N. Am. 1: 234. 1838, and Suppl. 681. 1840, as to coastal spp. only; Hook. Fl. Bor.-Am. 1: 108. 1840, in part, as to coastal spp. only; Hook. & Arn. Bot. Beech. Voy. Suppl. 326. 1840, as to name only.

*Nuttallia malvaeflora* Fisch. & Trautv. in Fisch. & Mey. Ind. Sem. Hort. Petrop. 3: 41. 1837.

*Sida delphinifolia* Nutt. in Torr. & Gray, Fl. N. Am. 1: 235. 1838; Walp. Rep. 1: 316. 1842.

*Sidalcea humilis* Gray in Mem. Am. Acad. N. S. 4: 20. 1849 (Pl. Fendl. 20. 1849); Walp. Ann. 2: 151. 1851-52; Brew. & Wats. Bot. Calif. 1: 84. 1876; Greene in Bull. Calif. Acad. Sci. 1: 75. 1885; Gray in Proc. Am. Acad. 21: 409. 1886.

*S. delphinifolia* (Nutt.) Greene, Fl. Francis. 105. 1891, not of Gray, Pl. Fendl.

*S. delphinifolia* (Nutt.) Greene var. *humilis* Greene, Fl. Francis.  
106. 1891.

*S. scabra* Greene in Pittonia 3: 158. 1897.

*S. rostrata* Eastwood in Bull. Torr. Bot. Club 29: 80. 1902.

Perennial from a woody root, glabrescent, retrorsely hirsute (especially below), or with some stellate pubescence; stems several, simple or branched, partially decumbent to suberect, 0.5–8.5 dm. high; basal leaves orbicular, 1–8 cm. broad, crenate, or laciniately toothed, or slightly lobed, the lobes cuneate-obovate and variously dentate, the upper surface with appressed hairs, the lower surface with sparse stellate pubescence mixed with hirsute pubescence; cauline leaves more or less lobed or parted into linear or narrowly oblong, rather coarsely dentate segments, pubescence as for the basal leaves; stipules green or purplish, lanceolate or ovate and ciliate (if subulate, pubescent throughout); inflorescence a loose raceme, flowers large and often one in the axil of some of the uppermost leaves; bracts ovate, bidentate or deeply bifid, the lobes lanceolate or subulate, merely ciliate or pubescent; calyx more or less stellate-pubescent with some long hirsute hairs; the lobes often nerved, ovate-deltoid, becoming deltoid-lanceolate or lanceolate; petals purple or rose-purple (rarely white), emarginate, up to 2.5 cm. long; anthers rarely purple; young carpels glabrous (rarely hirsute), mature carpels favose-reticulate on sides and back.

Distribution: along the coast from southern Oregon to northern Lower California, Mexico.

Specimens examined:

OREGON: Gold Beach, 1 June 1915, *Hoyt* 71 (S); Port Orford, 20 June 1919, *Peck* 9068 (G, M); Port Orford, 15 June 1926, *Peck* 14669 (Wil.).

CALIFORNIA: HUMBOLDT COUNTY—Bucksport, 11 June 1905, 0–500 ft. alt., *Tracy* 2193, 2194 (C); near Hydesville, 100–300 ft. alt., 11 May 1912, *Tracy & Babcock* 3595 (C); near Hydesville, 100–300 ft. alt., 11 May 1912, *Tracy & Babcock* 3596 (C); near Hydesville, 100–300 ft. alt., 11 May 1912, *Tracy & Babcock* 3597 (C); Alton, 100–300 ft. alt., 9 June 1912, *Tracy* 3669 (C, US); Kneeland Prairie, 2500 ft. alt., 28 June 1925, *Kildale* 803 (S); Alton Hill, 100 ft. alt., 23 March 1926, *Kildale* 1603 (S);

Gans Prairie, 2000 ft. alt., 10 July 1927, *Kildale 3727* (S); MENDOCINO COUNTY—near Ukiah, 1897, *Purdy* (C); near Mendocino, from sea-level to 500 ft. alt., June 1898, *H. E. Brown 815* (C, M, US, COTYPES of *S. rostrata* Eastwood); Fort Bragg, 8–16 Aug. 1912, *Eastwood 1608* (CAS); Fort Bragg, 6 July 1920, *Duncan 155* (S); Mendocino City, 28 June 1922, *Eastwood 11465* (CAS, US); SONOMA COUNTY—*Samuels 31* (US); near Healdsburg, April 1897, *King* (C); beach from Sea View to Stewart's Point, 5 April 1897, *M. S. Baker* (C); Dillon's Beach, April 1899, *M. S. Baker* (P); three miles south of Healdsburg, 9 April 1902, *Heller & Brown 5235* (ANSP, F, G, M, P, S, US); Bennett Valley, southeast of Santa Rosa, 8 April 1902, *Heller & Brown 5227* (S, US); Petaluma, 7 March 1913, *Condit* (C); road to Bodega Point, 13 May 1917, *Eastwood* (CAS); near Healdsburg, 27 April 1918, *Abrams 6921* (S); Petaluma, 8 May 1921, *Eastwood 10460* (CAS); Petaluma, 24 April 1924, *M. E. Jones* (P); MARIN COUNTY—Angel Island, 14 March 1876, *McLean* (C); Liberty's, 1 May 1890, *K. Brandegee* (C); San Rafael, 6 May 1893, *Blankinship* (G); near Tiburon, April 1895, *Sonne 1428* (C); on the Fairfax Road, 18 April 1897, *Eastwood* (US); Bodega Bay, 25 May 1900, *Chandler 713* (C); Mt. Tamalpais, 26 Feb. 1900, *Chandler 529* (C); Pt. Reyes, May 1906, *Eastwood* (CAS); Kentfield, 30 April 1912, *Parsons* (CAS); Kentfield, 19 May 1912, *Eastwood 25* (CAS, G, M, US); Sausalito, 6 March 1913, *Schmitt* (US); Tocaloma, 4 April 1917, *Mason 79* (S); near Pt. Reyes station, 13 May 1917, *Eastwood* (CAS); Lagunitas, 28 April 1918, *Grinnell* (S); Kentfield, 27 March 1921, *Epling 5197* (M); Sausalito, 1 April 1921, *Eastwood* (CAS); Pt. Reyes, 13 May 1923, *Eastwood 11807* (CAS); Mill Valley, 30 March 1929, *Raven* (CP); NAPA COUNTY—Napa Valley, 5 May 1853–4, *Bigelow* (G, US); Vineland, 26 April 1893, *Jepson* (C, US); Napa, 24 April 1924, *M. E. Jones* (CAS, P); SOLANO COUNTY—Chandler's Field, Arequipa Hills, 2–6 May 1891, *Jepson* (C, US); Vallejo, 15 April 1914, *W. W. Jones 131* (G); CONTRA COSTA COUNTY—Byron, 1892, *Bioletti* (ND TYPE of *S. scabra* Greene); Camp 69, Walnut Creek, 30 April 1862, *Brewer 1002* (G, US, C); Moraga Valley, 31 March 1917, *Evermann* (CAS); ALAMEDA COUNTY—Oakland, 1863, *Holder 2537* (US); Mission, Oakland, March 1867, *Rattan* (S);

Oakland, 18 March 1888, *Drew* (C); Alameda, 11 May 1891, *Greene* (C, US); near Newark, 6 May 1895, *Davy 1101* (C, ND); Berkeley, 22 Feb. 1899, *Chandler 214* (C); north Berkeley, April 1899, *H. M. Hall* (G); Berkeley Hills, 7 May 1901, *Chandler 1020* (US); hills near Berkeley, 1000 ft. alt., 12 April 1902, *Tracy 1363* (C, P); Berkeley Hills, 26 April 1903, *Mulliken 35* (C); Berkeley, May 1906, *Eastwood* (CAS); vicinity of Berkeley, May-June 1906, *Walker 83* (C); Thousand Oaks, near Berkeley, 28 March 1920, *Johnston* (P); Claremont Cañon, back of Berkeley, 3 April 1920, *Johnston* (P); SAN FRANCISCO COUNTY—*Williamson* (ANSP); San Francisco, 1865, *Bolander 12* (G, M); San Francisco, 8 March 1868, *Kellogg & Harford 108* (CAS, M, US); Mission Dolores, San Francisco, 188—, *Kellogg* (S); Presidio, 28 May 1887, *B. H. Smith* (ANSP); near San Francisco, 1888, *Greene* (CAS); San Francisco, May 1891, *T. S. Brandegee* (C); Lake Merced, May 1893, *Michener & Bioletti (1344a ?)* (C, M, US, W); San Francisco, June 1893, *T. S. Brandegee* (C); San Francisco, April 1894, *Eastwood* (G); between Ocean View and Lake Merced, 24 March 1895, *Dudley* (S); San Francisco, 19 Jan. 1895, *Cannon* (G); San Francisco, 10 April 1897, *Blasdale* (C); San Francisco, 23 April 1907, *K. Brandegee* (C, P); Lake Merced, San Francisco, 23 April 1907, *K. Brandegee* (C); near San Francisco, 20 March 1913, *Schmitt* (US); SAN MATEO COUNTY—Pescadero Ranch, 25 May 1861, *Brewer 667* (C, M, US); mountains back of San Mateo, 11 June 1887, *Greene* (ANSP, C); 22 March 1894, *Tidestrom* (C); near Pebble Beach, Pescadero, 25 March 1894, *Dudley* (S); woodside to Crystal Springs, May 1894, *Dudley* (S); Millbrae, 20 April 1895, *Davy 1024* (C); Pebble Beach Pasture, Pescadero, 19 April 1896, *Dudley* (S); by road, top of Montara Mts., 17 May 1900, *Dudley* (S); Colma, 5 May 1901, *Abrams 1602* (S); San Bruno Hills, May 1903, *Elmer 4637* (C, CAS, M, OAC, P, S, US); near Adelanta Villa, March 1903, *Davis* (S); Cahil Ridge below McFarland's, 10 June 1906, *Dudley* (S); Crystal Springs, 10 June 1902, *Eastwood 329* (CAS, US); Crystal Springs, 1912, *Eastwood* (CAS); n. pt. of Half Moon Bay, 10 March 1916, *Stinchfield 268* (S); Moss Beach, 18 March 1917, *Browne* (W); Lagoon of Arroyo de los Frijoles, 100 ft. alt., 26 April 1920, *Ferris 1972* (S); Rockaway Beach,



summer 1925, *Kelley* (CAS); SANTA CLARA COUNTY—Alma, 24 May 1889, *Hasse* (M); between Lake Lagunita and Adelanta Villa, Stanford University, 3 May 1893, *Dudley* (S); Evergreen, 11 April 1893, *Davy 51* (C); Stanford University, April 1898, *Abrams* (S); near Evergreen, east of San Jose, 7 May 1898, *Dudley* (S); Stanford University, Feb. 1900, *Atkinson* (S); Stock-farm hills, 22 Feb. 1900, *Wight 102* (US); Stanford University, March 1901, *Abrams 1128* (M, P); Stanford University, 5 April 1902, *Abrams 2302* (G, M, S, US); near Stanford University, 9 March 1902, *C. F. Baker 275* (C, G, M, P, SCW, US); near Stanford University, 15 April 1902, *C. F. Baker 611* (C, CAS, F, G, M, ND, P, S, US); Stanford University, 15 April 1902, *C. F. Baker* (P); Palo Alto, 19 April 1910, *Mrs. T. C. Pease* (G); Canada Valley, near Gilroy, 3 April 1915, *J. W. Sheldon* (S); SANTA CRUZ COUNTY—Coast Region, 17 May 1902, *C. H. Thompson* (S); Santa Cruz, 19 April 1904, *Berg* (C); near Glenwood, 800–900 ft. alt., 17 June 1909, *R. J. Smith 11* (ANSP, C); Swanton, 12 May 1912, *Rich* (S); Santa Cruz Island, 6 June 1918, *Miller* (CAS); SAN BENITO COUNTY—Hollister, 14 April 1897, *Setchell* (C); MONTEREY COUNTY—Soledad, 20 April 1882, *M. E. Jones 3157* (CAS, M, P, US); 1883, *Meehan* (ANSP); Monterey, June 1889, *K. Brandegee* (C); March–May 1889, *Abbott* (CAS, G); Pacific Grove, Monterey, 25 March 1895, *Rutter 123* (US); Pacific Grove, 24 May 1899, *Chandler 318* (C); east of Carmel-Salinas divide, 10 June 1901, *Dudley* (S); Pacific Grove, April 1902, *Elmer 3569* (C, CAS, G, M, S, US); along railroad near Seaside, beyond Del Monte, 13 April 1903, *A. A. Heller 6567* (ANSP, C, G, M, P, S, US); Rancho Encinal, 13 April 1903, *Kellogg* (G); Monterey, June 1903, *A. A. Heller* (US); Pacific Grove, along the beach, 7 May 1903, *A. A. Heller* (G); Pacific Grove, 22 May 1903, *A. A. Heller* (G, M); forest near Carmel Bay, 5 July 1905, *Coleman* (S); Carmel Valley, 1 mile above the Mission, 2 April 1907, *Abrams 6424* (S); Pacific Grove, 12 June 1907, *Patterson & Wiltz* (CP); 17-mile Drive near Pebble Beach, 4 April 1909, *Abrams 4225* (S); dunes, Carmel, 7–10 Jan. 1910, *Mrs. T. C. Pease* (G); Carmel-by-the-Sea, 8 Feb. 1910, *Randall 13* (S); back of Pebble Beach Lodge, 17-mile Drive, 28 March 1910, *Randall 156* (S); near burnt district, 17-mile Drive, 30

March 1910, *Randall* 196 (S); Carmel-by-the-Sea, 10 April 1910, *Randall* 303 (S); Carmel-by-the-Sea, 10 April 1910, *Randall* (P); near Pebble Beach, 17-mile Drive, 30 April 1910, *Randall* 430 (S); Cypress Pt., 28 May 1912, *Eastwood* 82 (CAS, US); Pt. Pinos, 9 March 1913, *Eastwood* 2492 (CAS); Pacific Grove, 8 July 1914, *Newell* (CAS); San Juan Grade, 2 April 1917, *Abrams* 6429 (S); Carmel Highlands, 1 Jan. 1925, *Epling* 6224 (M, UCLA); Carmel Highlands, 1 Jan. 1925, *Epling* 6292 (M, UCLA); SAN LUIS OBISPO COUNTY—wooded hills, *Summers* (C); San Luis Mts., 19 April 1882, *Summers* (C); San Luis Valley, 17 March 1886, *Summers* (C); San Luis Mts., 27 April 1886, *Summers* 102 (C); San Luis Mts., 23 Nov. 1888, *Summers* (C); Arroyo Grande, May 1895, *King* (C); 1 mile south of Santa Margarita, 14 April 1925, *Bacigalupi* 1152 (S); 3 miles west of San Luis Obispo, 24 March 1925, *Munz* 9233 (C, P); Avila, 3 May 1926, *Eastwood* 13798 (CAS); roadside 3 miles east of Templeton, *Wiggins* 2075 (S); Morro, *Eastwood* 14310 (CAS); Morro, *Barber* (C); SANTA BARBARA COUNTY—*Nuttall* (ANSP TYPE of *Sida delphinifolia* Nutt., G); *Gibbons* 117 (ANSP); 1845-7, *Fremont's Expedition to California* (ANSP); Santa Barbara, near the sea, on foothills, March 1861, *Brewer* 280 (G, US); Santa Barbara, July 1875, *Rothrock* 14 (G); Point Salinas, May 1893, *Blockman* (C); 20 March 1896, *Hubby* 67 (C); Cuyama, Caliente Creek, 6 May 1896, *Eastwood* (C); Casmalia, 13 June-3 July 1906, *Eastwood* 830 (CAS); Lompoc, 30 April 1926, *Eastwood* 13717 (CAS); VENTURA COUNTY—Ojai, 10 April 1866, *Peckham* (US); Good-enough Meadow, 28 June 1896, *Dudley & Lamb* 4728 (P, S); Ojai Valley, 5, 8 May 1896, *Hubby* 28 (C, G); Ojai Valley, 8 May 1902, *H. M. Hall* 3196 (C); Upper Sonoran Zone, 5 July 1905, *H. M. Hall* 6503 (C); Seymour Creek, Mt. Pinos, 5900 ft. alt., 10 June 1923, *Munz* 6975 (P); Camarilla, 27 April 1926, *M. E. Jones* (P); RIVERSIDE COUNTY—San Jacinto Mts., 23 July 1890, *Orcutt* (M); San Jacinto, 1890, *Gregory* (C); San Jacinto Mts., 6000 ft. alt., 28 July 1897, *H. M. Hall* 739 (C, US); Strawberry Valley, 6000 ft. alt., June 1897, *H. M. Hall* 674 (C); San Jacinto Mts., 6000 ft. alt., Aug. 1897, *H. M. Hall* (M); Beaumont, 18 April 1897, *H. M. Hall* 468 (C); San Jacinto Mts., May 1899, *H. M. Hall* (C); Santa Ana Mts., canyons near

Murietta, 29 March 1916, *Robinson & Crocker* (M, P, US); Corona, 27 April 1918, *Munz 2144* (P); between Banning & Cabazon, 11 April 1920, *Jaeger 186* (US); Idyllwild, San Jacinto Mts., 5300 ft. alt., 1 June 1921, *M. F. Spencer 146* (C, G, P, US); Lamb's Canyon, near Banning, 2200 ft. alt., 25 April 1922, *M. F. Spencer* (M); Lamb's Canyon, near Banning, 2300 ft. alt., 25 April 1922, *M. F. Spencer 2016* (ANSP, G); Hemet Valley, 1 mile above Garner Ranch, 4550 ft. alt., 19 May 1922, *Munz & Johnston 5441* (C, P); Hemet Valley, 4600 ft. alt., 19 May 1922, *Munz & Johnston 5428* (P); San Jacinto Mts., 18 June 1922, *M. F. Spencer* (P); Coahuila Valley, 21 May 1927, *Munz 10836* (P); Idyllwild, 22-28 July 1928, *Van Dyke* (CAS); ORANGE COUNTY—San Juan, 5 April 1923, *Pierce* (P); LOS ANGELES COUNTY—Los Angeles, July 1897, *Nevin* (ANSP); Los Angeles, 188-, *Nevin 254* (ANSP, S); Los Angeles, 24 March 1889, *Fritchey 24* (M); grassy plains, May 1890, *Hasse 22* (US); plains, May 1891, *Hasse* (C, US); 1891, *Davidson* (S); Pomona, 1891, *Bereman 915* (M); 1895, *Davidson* (C); Leonis Valley, 20 May 1896, *Davy 2631* (G); San Dimas, 1500 ft. alt., 14 March 1897, *Chandler* (C); Santa Monica Forestry Station, 21 March 1897, *Barber* (C); Paloma, 1 Aug. 1898, *T. S. Brandegee* (S); Mink Hill, Pasadena, 11 Feb. 1900, *G. B. Grant 2716* (S); 1000 ft. alt., 1 March 1901, *G. B. Grant 3507* (US); Eagle Rock Valley, 17 March 1901, *G. B. Grant 9190* (S); Puete, 2 April 1901, *Shaw 583* (S); Pasadena near Devil's Gate, 8 April 1901, *Abrams 1436* (P, S); Eagle Rock Canyon, 16 March 1902, *Braunton 182* (US); Pasadena, Oak Knoll, 4 May 1904, *G. B. Grant 6172* (S); Pomona, Claremont, 28 March 1915, *Coleman* (P); KERN COUNTY—Tehachapi, 5 May 1905, *A. A. Heller 7830* (ANSP, F, G, M, S, US); Tehachapi, 15 May 1905, *K. Brandegee* (C); Johnson Canyon, Walker Basin, 3 June 1905, *Grinnell 86, 87* (US); Tehachapi, 13 May 1913, *Eastwood 3244* (CAS, G, US); Weldon, 19 April 1915, *Evermann* (CAS, US); Tehachapi Valley, 3950 ft. alt., 23 May 1925, *Feudge 1159* (P); SAN BERNARDINO COUNTY—April 1884-5, *Antisell 30* (G); San Gorgonio Pass, 1881, *Parry* (M); clay foothills, Highlands, 17 April 1889, *S. B. Parish 2067* (F, G, ND, S); Highlands, 15 May 1891, *S. B. Parish 2198* (OAC, SCW, US, W); near Adelanta Valley, 22 April 1894, *Dudley* (S); vicinity of San

Bernardino, 1000–2500 ft. alt., May 1897, *S. B. Parish* (M, S); San Bernardino, 1000–2500 ft. alt., 11 May 1895, *S. B. Parish* 3640 (C, CAS, G, US); San Gorgonio Pass, 600 m. alt., 5 April 1898, *Leiberg* 3248 (US); Redlands, 4 Feb. 1904, *Berg* (C); Stewart's Pond, 4 May 1904, *Wilder* (P); Sand Canyon, Yucaipa, May 1906, *G. B. Grant* 475 (CAS); roadside near Parish Ranch, 19 May 1907, *Reed* 1351 (P); San Bernardino Valley, 300 m. alt., 8 June 1908, *S. B. Parish* 6957 (C); Sand Canyon, near Redlands, 25 May 1918, *S. B. Parish* 11783 (M, P); Holcomb Creek, Santa Ana Tributary, 23 June 1922, *Peirson* 2056 (S); Yucaipa, 2750 ft. alt., 10 May 1924, *Feudge* 815 (P); below Mill Creek Power Station at Yucaipa Road, 7 July 1927, *Craig, Newsom & Hilend* 337 (M, P); SAN DIEGO COUNTY—May 1852, *Thurber* 559 (G, US); 1874, *Cleveland* (G, M); Cuyamaca Mts., July 1875, *Palmer* 24 (C, F, M); Chollas Valley, 10 April 1884, *Orcutt* 305 (F, US); Laguna, 16 April 1889, *Orcutt* (M); at San Diego, 3 April 1891, *Dunn* (S, W); Escondido, March 1893, *King* (C); San Ysabel, 19 April 1893, *Henshaw* 121 (US); Encinitas, April 1894, *Angier* (US); 9 May 1894, *T. S. Brandegee* (C); Witch Creek, May 1894, *Alderson* (G, ND, S); Laguna Mts., 20 June 1904, *T. S. Brandegee* (C); Del Mar, 24 March 1895, *Angier* 90 (M); San Diego, 5 June 1895, *Stokes* (S); on the mesa, 21 March 1896, *Cummings* (G); San Diego, April 1897, *Wislizenus* 915 (M); April 1901, *K. Brandegee* (C); San Diego, 19 March 1901, *Setchell* (C, M); April 1902, *G. B. Grant* 2004 (C, S); near Fallbrook, 26 April 1903, *Abrams* 3311 (ANSP, G, M, P, S, US); Hill Valley near Campo, 2 June 1903, *Abrams* 3740 (S); Cuyamaca Lake, 23 June 1903, *Abrams* 3832 (3822) (M, G, S, US); Cuyamaca Lake, 23 June 1903, *Abrams* 3831 (M, S, US); La Jolla, 16 April 1904, *Chandler* 5157 (S); Descanso, 24 May 1906, *T. S. Brandegee* (C); May 1906, *K. Brandegee* (C); May 1906, *G. B. Grant* 6850 (S); Point Loma, 21 April 1913, *Eastwood* 2862 (CAS); old clearing, La Jolla, 8 March 1914, *Clements & Clements* 6 (ANSP, C, F, G, M); Green Valley, 30 May 1915, *Collins & Kempton* 149 (G, US); 19 April 1916, *M. F. Spencer* 146 (C, G, P, US); Balboa Park, 14 May 1917, *Street* (P); 10 miles east of Campo, 10 June 1917, *McGregor* 939 (S); El Granito Springs, 10 April 1918, *Carlson* (CAS); Cuya-

maca Dam, 20 June 1918, *McGregor* (S); Cuyamaca, 25 June 1919, *Eastwood 9132* (CAS); Descanso, 26 June 1919, *Eastwood 9183* (CAS); Laguna Mts., 28 June 1919, *Eastwood 9195* (CAS); Campo, 23 April 1920, *Eastwood 9462* (CAS); Dead Man's Hole, near Warner's Hot Springs, 1 May 1925, *Jaeger* (C, P); near Fallbrook, 750 ft. alt., 15 May 1920, *Munz 3889* (P); 10 miles north of Descanso, 27 June 1923, *Harwood & Munz 7166* (P); near Doane Valley, Palomar Mts., 4800 ft. alt., 22 June 1924, *Munz 8272* (P); near Laguna Camp, Laguna Mts., 25 June 1924, *Munz 8360* (G); Fallbrook, 21 March 1925, *Jaeger* (P); between Escondido and Rincon, 19 April 1925, *Cernman* (OAC); Dead Man's Hole, near Oak Grove, 1 May 1925, *Jaeger* (C, P); Cuyamaca Lake, 4750 ft. alt., 18 May 1925, *Munz 9778* (CP, P); Cuyamaca Lake, 4750 ft. alt., 18 May 1925, *Munz 9777* (C, P); hillside on Banner Grade, 3500 ft. alt., 18 May 1925, *Keck & McCully 132* (P); 4-5 miles from Jamul on road to Barrett Dam, 7 March 1926, *Wiggins 1961* (S); Henshaw Dam, 29 May 1926, *M. E. Jones* (S); Laguna Mts., 22 May 1927, *Sanford* (CAS); Witch Creek, *Alderson* (C); WITHOUT LOCALITY—*Hartweg 1666* (G); 18—, *Bridges 40* (US); Nova Calif., 1833, *Douglas* (G TYPE of *S. humilis* Gray); *Ross* (G); *Fremont's Expedition to California*, 1845-7 (G, US); 1853-4, *Bigelow* (G, US); 18—, *Parry* (M); 1859, *Wallace* (G); 1875, *Vasey* (US); 1879, *Heap* (M); 1880, *Norton* (M); 1880, *Bush* (US); Los Angeles and northward, 1885, *Gray* (G); 1889, *Parry* (M).

MEXICO: LOWER CALIFORNIA—Nachoguero Valley, 1 June 1894, *Mearns 3363* (S, US); northwest of Ensenada, 3 May 1923, *McKeever 31* (G, US); Ensenada, 13 April 1925, *M. E. Jones* (P); 16 miles southeast of Tecate, 12 May 1925, *Munz 9501* (P, S).

In order to clarify the synonymy of this species it is necessary to consider two separate and individual plants, that of the 'Prodromus'<sup>29</sup> and that of the 'Botanical Register.'<sup>30</sup>

De Candolle in the 'Prodromus' gave a very brief description of *Sida malvaeflora* based upon a drawing by Mocino and Sesse in the 'Calques des Dessins'<sup>31</sup> of a plant collected, no doubt, at

<sup>29</sup> DeCandolle, *Prod.* 1: 474. 1824.

<sup>30</sup> Lindley in *Bot. Reg.* 12: 1036, pl. 1036. 1826.

<sup>31</sup> Mocino & Sesse, *Calques des Dessins de la Flore du Mexique* 1: pl. 70. 1874.



Monterey, California (a blueprint of this is in the Missouri Botanical Garden Library).

Lindley in 1826 applied this name to an Oregon plant collected by David Douglas on the "Multomah" (Multnomah) River, a branch of the Columbia, and stated that it was probably the same plant as that of the 'Prodromus,' which de Candolle "was unable to refer to any certain station in the genus [*Sida*]."

The Douglas plant is conspecific with the *Sidalcea campestris* of Greene,<sup>22</sup> but because of the confused synonymy of that time Greene did not recognize this fact and founded his species on a collection of Howell from "dry prairies" of the Willamette Valley, Oregon, distributed as *S. humilis*. As *S. campestris* is restricted to the Willamette Valley, then without doubt the *Sida malvaeflora* of Torrey and Gray, and of Hooker and Arnott from the "Wahlamet and Umptqua" Valleys is conspecific. However, Dr. Gray<sup>23</sup> in 1849 erroneously combined *S. campestris* with *S. oregana* but he corrected this error in 1887.<sup>24</sup>

When Dr. Gray<sup>25</sup> proposed the genus *Sidalcea* he described *S. humilis*, based on collections of Douglas, Fremont, and Hartweg, from the coastal regions of California, and a Russian collection about San Francisco Bay. At the same time he described *S. delphinifolia*, based as he inferred on *Sida delphinifolia* of Nuttall. Later he<sup>26</sup> gave the name *Sidalcea malvaeflora* to plants which he thought were the same as those of the 'Prodromus,'<sup>27</sup> but Gray's description applies to *S. neo-mexicana* as already used for a species of the inland regions. At this time Gray realized that his *Sidalcea delphinifolia* was not the *Sida delphinifolia* of Nuttall, so he named it *S. hirsuta*, saying that Nuttall's species might be the same as *S. malvaeflora* of the coastal region. Greene<sup>28</sup> did not know of this case of mistaken identity and in his 'Synopsis' still confused *S. malvaeflora* with *S. neo-mexicana* and retained *S. humilis* of Gray for the coastal form. In 'Flora Franciscana'

<sup>22</sup> Greene in Bull. Calif. Acad. Sci. 1: 76. 1885.

<sup>23</sup> Gray in Mem. Am. Acad. N. S. 4: 20. 1849 (Pl. Fendl. 20. 1849).

<sup>24</sup> Gray in Proc. Am. Acad. 22: 286. 1887.

<sup>25</sup> Gray in Mem. Am. Acad. N. S. 4: 18. 1849 (Pl. Fendl. 18. 1849).

<sup>26</sup> Gray in Smiths. Contr. 3: 16. 1852 (Pl. Wright. 1: 16. 1852).

<sup>27</sup> DeCandolle, Prod. 1: 474. 1824.

<sup>28</sup> Greene in Bull. Calif. Acad. Sci. 1: 75. 1885.

Greene<sup>39</sup> kept *S. delphinifolia* as the valid name for *S. malvaeflora*, and var. *humilis* (Gray) Greene for Gray's *S. humilis* and still used the name *S. malvaeflora* for *S. neo-mexicana*. Greene<sup>39</sup> had formerly said: "It is to be hoped that the *Sida malvaeflora* of Mocino and Sesse of Mexico is really the same thing [i. e. *Sidalcea malvaeflora*] otherwise the name of *S. neo-mexicana* is to be restored to this."

This restoration was made by Gray,<sup>40</sup> concerning which he says: "M. Alphonse De Candolle, in the preface to the 'Calques des Dessins de la Flore du Mexique de Mocino et Sesse,' several years ago pointed out the fact that the original *Sida malvaeflora* DC. was not the plant of the 'Botanical Register' and not the plant taken up by me as *Sidalcea malvaeflora*. Also I had recognized Mocino's drawing to belong to what I had named *Sidalcea humilis*, the common species of the California coast; . . . while the other names, *S. neo-mexicana* and *S. oregana* of Pl. Fendl., come into use for the interior country species."

If, then, the name *Sidalcea malvaeflora* is maintained for the species of the coastal region and outer coast ranges from Oregon to Lower California, and other names retained for the more inland species as given above, although the range may be extended northward and southward and slightly eastward, there will be little reason for confusion as to what constitutes the common coastal species. It is a very polymorphic species and shows great variation in the coastal counties. Specimens from Alameda and San Mateo Counties show a very coarse pubescence throughout, those from Santa Clara County a delicately cleft leaf form, whereas those from San Diego County are almost scurfy due to the shortness and puberulence of the hairs, although others are almost glabrous, described as "glabriuscula" in the 'Prodromus.'

*Sidalcea rostrata* of Eastwood is a less-cut leaf form; and, as all young carpels are "rostrate" and the other characters given in the original description of this species apply to the low more decumbent forms of the middle-coast region, it seems best to treat this merely as a local variant of the species.

<sup>39</sup> Greene, Fl. Francis. 105. 1891.

<sup>40</sup> Gray in Proc. Am. Acad. 21: 409. 1886.

*Sidalcea scabra* of Greene, from the vicinity of Byron Hot Springs, although having less orbicular leaves and a closer, harsher puberulence, has very close relatives in many of the more southern forms. This apparent relationship is probably due to some environmental influence, corresponding to the ecological conditions in the desert region of the south. In dry or sandy regions the plants have a tendency toward close stellate or more radiate hairs, which does not occur in the regions of greater moisture. This is exemplified by the plants from San Mateo and Humboldt Counties, as contrasted with those from the Tehachapi region and the more arid parts of San Diego County.

12a. Var. *californica* (Nutt.) Jepson, Man. Fl. Pl. Calif. 630. 1925.

*Sida californica* Nutt. in Torr. & Gray, Fl. N. Am. 1: 233. 1838; Walp. Rep. 1: 316. 1842. Walp. Ann. 2: 151. 1851-52.

*Sidalcea californica* (Nutt.) Gray in Mem. Am. Acad. N. S. 4: 19. 1849 (Pl. Fendl. 19. 1849); in Proc. Am. Acad. 22: 286. 1887; Greene, Fl. Francis. 106. 1891; E. G. Baker in Jour. Bot. 29: 51. 1891 (Synopsis Malveae, 30. 1894); Gray, Syn. Fl. N. Am. 1<sup>st</sup>: 304. 1897; Davidson & Moxley, Fl. S. Calif. 231. 1923.

Velvety stellate-tomentose throughout; stem erect, stout, up to 7.5 dm. high; leaves less deeply lobed than in the species, densely stellate-pubescent on the lower surface, with few-rayed appressed hairs on the upper surface; calyx 3-5-nerved.

Distribution: Santa Inez Mts., Santa Barbara County to Ventura County, California.

Specimens examined:

CALIFORNIA: SANTA BARBARA COUNTY—*Nuttall* (ANSP TYPE of *Sida californica* Nutt.); Santa Inez Mts., near Santa Barbara, (26?) March 1861, *Brewer 337* (C, G, US); Santa Barbara, 13 April 1887, *B. H. Smith* (ANSP); Mission Canyon, Santa Barbara, Feb.-May 1885, *Gray* (G); Santa Inez Mts., 1888, *T. S. Brandegee* (C); Santa Barbara, June 1889, *T. S. Brandegee* (C); Santa Barbara, 189-, *L. G. Yates* (CAS); Montecito, March 1895, *L. G. Yates* (US); Santa Barbara, May 1902, *Elmer 3767* (C, G, M, P, S, US); Santa Barbara, 25 April 1903, *Grant 5452* (C); Mission Canyon, 21 April 1908, *Eastwood 20* (C, F, G, M,

US); among hills south of Lompoc, 14 June 1913, *Suksdorf* 182 (G); Santa Barbara, 12 April 1926, *Munz* 10327 (CP, P); San Miguelito Canyon, Lompoc, 10 April 1926, *Munz* 10271 (P); VENTURA COUNTY—Ojai Valley, 5–8 May 1896, *Hubby* (C, G); Foster Park, Ventura, 14 April 1916, *Eastwood* 4976 (CAS).

13. *S. reptans* Greene in *Pittonia* 3: 159. 1897; Hall & Hall, Yosemite Fl. 158. 1912; Smiley in Univ. Calif. Publ. Bot. 9: 264. 1921.

*S. spicata* Greene var. *reptans* (Greene) Jepson, Man. Fl. Pl. Calif. 630. 1925.

*S. favosa* Congdon in *Erythea* 7: 183. 1900.

Perennial from a woody tap-root; stems one to several, usually simple, decumbent at the base, creeping and rooting at the nodes, the erect portion up to 6 dm. high, slender, and hirsute; leaves mostly from the basal horizontal portion of the stem, orbicular, 1–7 cm. broad, crenate, coarsely dentate or rarely lobed, the lobes or segments obtuse and mucronate, more or less hirsute on both surfaces, sinus closed or truncate, petiole greatly elongated up to 2.5 dm. long, hirsute; cauline leaves deeply lobed or parted, the segments coarsely dentate or lobed, sinus more open, petioles short; stipules of the basal leaves thin, purplish, almost oblong, those of the cauline leaves ovate and blunt or acute, ciliate; inflorescence few-flowered, racemose, simple or rarely branched; rhachis, pedicels, bracts, and calyx rough with a short-stellate tomentum; bracts simple, often bidentate, oblong or ovate, thickish, ciliate, of equal length with the pedicels; calyx-lobes deltoid-ovate and acute, or ovate-lanceolate and acuminate, margins ciliate and veins hirsute; petals purple, emarginate and denticulate; carpels 8–10, not depressed, favose with extremely short meshes, when young densely stellate-pubescent on the back and the apiculation.

Distribution: in marshes and wet meadows in the Sierra Nevada from Amador County south to San Bernardino County, California.

Specimens examined:

CALIFORNIA: AMADOR COUNTY—Antelope, July 1892, *Hansen* 506 (M, ND TYPE, P, S); July 1893, *Hansen* 506 (G, US);

23 July 1896, *Hansen 506* (P, US); CALAVERAS COUNTY—18-30 May 1895, *Davy 1505* (G); TUOLUMNE COUNTY—18—, *Chesnut & Drew* (C); Hog Ranch, 8 July 1896, *Congdon 14* (G, S); Mather, 15 July 1922, *H. M. Hall 11809* (C); Mather, 16 July 1923, *Munz 7349* (P); Pine Crest, 4 July 1926, *Pendleton* (OAC); Cold Springs, 10 July 1926, *R. A. Pendleton* (OAC); YOSEMITE NATIONAL PARK—Big Tree Grove, Yosemite Valley, 1860-67, *Bolander* (C, G, US); MARIPOSA COUNTY—Koontz Place, 11 Aug. 1899, *Congdon* (C TYPE of *S. favosa* Congdon); MADERA COUNTY—Shuteye Mountain, 9 Sept. 1907, *Murdoch 2512* (G, US); FRESNO COUNTY—Pine Ridge, 15, 25 June 1900, *Hall & Chandler 166* (ANSP, C, M, US); TULARE COUNTY—General Grant Grove, 20 July 1892, *T. S. Brandegee* (C); Grant Park, 11 Aug. 1895, *Dudley 1199* (S); SAN BERNARDINO COUNTY—near Bear Valley, July 1899, *Hall 1325* (C); Bear Valley, San Bernardino Mts., 19 July 1900, *M. E. Jones 6209* (P, S); Aug. 1900, *Shaw & Illingsworth 51* (S); Bear Valley, San Bernardino Mts., 2 Aug. 1902, *Abrams 2860* (ANSP, CAS, C, G, M, P, US); 2 miles east of Bluff Lake, 1 July 1926, *Munz 10572* (C, P); WITHOUT LOCALITY—Ellis Meadows, *K. Brandegee* (C); July 1908, *Davidson* (S); Round Mt., 30 June 1901, *Hopping 177* (C); near Jackass Meadows, Upper San Joaquin, 16 Aug. 1895, *Congdon 27* (G); General Grant National Park, 4 July 1927, *Jessel* (CAS).

No definite characters appear in the specimens from San Bernardino County, previously referred either to *S. malvaeflora* or *S. neo-mexicana*, to separate them from *S. reptans*.

*Sidalcea favosa* Congdon<sup>41</sup> differs in no essentials from *S. reptans*. With the exception of "stems decumbent," Congdon's description corresponds equally well to that of Greene for *S. reptans*.

14. *S. asprella* Greene in Bull. Calif. Acad. Sci. 1: 78. 1885; Gray in Proc. Am. Acad. 22: 286. 1887; Greene, Fl. Francis. 106. 1891; E. G. Baker in Jour. Bot. 29: 52. 1891 (Synopsis Malveae, 30. 1894); Gray, Syn. Fl. N. Am. 1<sup>1</sup>: 305. 1897, in part; Hall & Hall, Yosemite Fl. 157. 1912; Smiley in Univ. Calif. Publ. Bot. 9: 265. 1921, as to name only.

<sup>41</sup> Congdon in Erythra 7: 183. 1900.



*S. malvaeflora* (DC.) Gray var. *asprella* Jepson, Man. Fl. Pl. Calif. 630. 1925.

*S. elegans* Greene in Cyb. Columb. 1: 35. 1914.

Perennial from a slender horizontal root, roughish throughout with a short stellate pubescence or almost scurfy-puberulent; stems several, slender, procumbent or erect, up to 7.5 dm. high, simple or branched, leafy up to the inflorescence; all leaves similar in shape, orbicular to semi-orbicular, differing only in size, 1-10 cm. broad, cleft about halfway to the base, the lobes subentire, crenate or irregularly and coarsely dentate; stipules lance-linear or subulate; inflorescence slender, racemose, few-flowered, up to 4.5 dm. long; rhachis, bracts, pedicels, and calyx densely stellate-pubescent; bracts bifid, very minute; calyx accrescent, the lobes ovate or triangular-lanceolate, acute, prominently 3-nerved; petals purple, as much as 2.5 cm. long; carpels large, transversely rugose-reticulate, slightly angulate.

Distribution: western Oregon and hillsides of the lower Sierra Nevada south to southern California.

Specimens examined:

OREGON: MARION COUNTY—Silverton, June 1882, *T. Howell* 603 (G); LANE COUNTY—near Coburg, Willamette Valley, 4 May 1887, *T. Howell* (C, ND, S); DOUGLAS COUNTY—Oakland, 1874, *Nevins* (US); Glendale, 30 June 1887, *T. Howell* 733 (G); Glendale, 19 June 1902, *M. E. Jones* (P); Riddle, 26 June 1913, *Peck* 6853 (Wil.); Rogue River Canyon near Mule Creek, 27 June 1917, *Peck* 6846 (Wil.); 3 miles northeast of Gunter, 1100 ft. alt., 19 June 1919, *J. C. Nelson* 2678 (G); Dillard, 10 miles south of Roseburg, 4 July 1927, *J. W. Thompson* 2035 (S); Camas Valley, 3 June 1928, *Thompson* 4446 (M); just north of Oakland, 2 June 1928, *Thompson* 4389 (M); CURRY COUNTY—2 miles south of Illahe, 21 June 1917, *J. C. Nelson* 1360 (G); above Agness, 22 May 1929, *Henderson* 10149 (O); Tolman Ranch, up Chetco River 20 miles, 5 July 1929, *Leach & Leach* 2422 (O); near Carpenterville, 14 July 1929, *Henderson* 11357 (O); JOSEPHINE COUNTY—Grant's Pass, 12 June-11 July 1886, *Henderson* 149 (ANSP, C, OAC); dry pine woods, Grant's Pass, 20 June 1886, *Henderson* (O); Grant's Pass, 1886, *Henderson* 37 (G); Grant's Pass, 26 June 1886, *Henderson* (O); Eight Dollar Mt., 12 June

1904, *Piper 6171* (US TYPE of *S. elegans* Greene); Grant's Pass, 24 June 1909, *Peck 6878* (Wil.); Grant's Pass, 6 May 1912, *Prescott* (G, S, Wil.); Pacific Highway, 12 May 1924, *Abrams & Benson 10424* (S); near Waldo, 25 April 1926, *Henderson 5998* (CAS, M, O, RM, S); base of Eight Dollar Mt. near Selma, 19 June 1926, *Henderson 7233* (O); 10 miles southwest of Waldo, 7 June 1928, *Thompson 4584* (M); JACKSON COUNTY—near Wimer, 28 May 1892, *Hammond 59* (US); near Elk Creek, 3000–4000 ft. alt., *Applegate 2568* (US); Lower Applegate Creek, 700 ft. alt., 17 June 1899, *Leiberg 4098* (US); Trail, 2 June 1924, *Sherwood 831* (Wil.); Jackson Creek,  $\frac{3}{4}$  mile west of Jacksonville, 10 May 1924, *Abrams & Benson 10245* (S); WITHOUT DEFINITE LOCALITY—1871, *E. Hall 71* in part (M); southern Oregon, 1893, *Durden* (C); head of Coos River, 3 Sept. 1911, *House 4835* (US).

CALIFORNIA: DEL NORTE COUNTY—Douglas Park, 9 miles east of Crescent City on Grant's Pass Road, 4 July 1926, *Kildale 2280* (S); Siskiyou Mts., Sept. 1885, *T. S. Brandegee* (C); grade east of Gasquets, 3 July 1899, *Dudley* (S); near Gasquets, 27 June–1 July 1922, *Abrams 8506* (P, S); Shelley Creek, 6 Aug. 1923, *Eastwood 12080* (CAS); Gasquets, 10 Aug. 1923, *Eastwood 12226* (CAS); Douglas Park, 5 June 1928, *Thompson 4507* (M); HUMBOLDT COUNTY—Willow Creek, May 1883, *Rattan* (G); Arcata Trail via Willow Creek, June 1883, *Rattan* (S); Klamath River, 1400 ft. alt., June 1901, *Chandler 1466* (C); Klamath River, 1000 ft. alt., June 1901, *Chandler 1438* (C); valley of Van Duzen River opposite Buck Mt., 1500 ft. alt., 27 June–30 July 1908, *Tracy 2813* (C, G, US); along road between Three Creeks and mouth of Willow Creek, about 2500 ft. alt., 6 July 1911, *Tracy 3349* (C, G, US); near Hydesville, 100–300 ft. alt., 11 May 1912, *Tracy & Babcock 3598* (C); Horse Mountain, about 5000 ft. alt., 20 June 1926, *Tracy 7659* (C); SISKIYOU COUNTY—Mount Shasta & vicinity, 13–27 July 1892, *Palmer 2519* (US); Sisson, 15 July 1902, *Setchell & Dobie* (C); Mount Shasta, Sept. 1902, *G. B. Grant 5144* (C); near Shasta Springs, 5 June 1905, *A. A. Heller 7987* (M, S, US); McCloud, 15 July 1912, *Eastwood 1101* (CAS, G, M); McCloud, 15 July 1912, *Eastwood 1115* (CAS, US); near Sisson, 22 June 1916, *A. A. Heller 12423* (CAS, F, G, M,

OAC, S, US); Shasta Springs, 2 Sept. 1917, *Eastwood 6692* (CAS, US); Bigelow's, McCloud River, 25 July 1921, *Eastwood 10805* (CAS); Bear Spring, on road to Medicine Lake, 29 July 1921, *Eastwood 10977* (CAS, G); Shasta Springs, 21 May 1923, *Eastwood 11883* (CAS); near Dunsmuir, April 1925, *Reinoehl* (S); TRINITY COUNTY—Mad River, 1 July 1890, *Price* (C); Upper Mad River, 26 June 1893, *Blankinship* (C); summit between Mad and Trinity Rivers, on Eureka-Red Bluff Road, 22 July 1916, *Abrams 6193* (S, US); SHASTA COUNTY—near Redding, 27 May 1905, *A. A. Heller 7876* (ANSP, C, F, G, M, S, US); Redding, 30 April 1910, *W. W. Jones 130* (G); Montgomery Creek, 27 June 1912, *Eastwood 671* (CAS, G, US); Goose Valley, 29 June–11 July 1912, *Eastwood 754* (CAS, G, US); Redding, 24 May 1913, *L. E. Smith 243* (G, US); Goose Valley, 29 June–8 July 1912, *Eastwood 952* (CAS, US); Burney, 28 June 1912, *Eastwood 704* (US); Burney, 17 June 1923, *Bethel* (CAS); BUTTE COUNTY—Mt. Ida Ranch, 10 miles east of Oroville, 25 May 1915, *A. A. Heller 11898* (CAS, F, G, M, OAC, S, US); YUBA COUNTY—near Camptonville, 1 July 1884, *Greene* (G COTYPE); near Los Vergils Dam, 22 May 1921, *Eastwood* (CAS); NEVADA COUNTY—between Grass Valley and Nevada City, 14 July 1905, *A. A. Heller 8105* (ANSP, G, M, US); west of Grass Valley, 24 May 1919, *A. A. Heller 13189* (ANSP, CAS, F, G, M, S, US); Nevada City, 20–22 June 1912, *Eastwood 617* (CAS, G, M, US); near Grass Valley, about 850 m. alt., 7 June 1916, *Hall & Essig 242* (10163) (C, CAS, M, P, S, US); PLACER COUNTY—Little Bear Valley, 8 Aug. 1909, *Dudley* (S); 8 miles east of Colfax, 19 June 1917, *A. A. Heller 12744* (ANSP, CAS, G, OAC, S, US); EL-DORADO COUNTY—rocky places, 22 May 1903, *Gross* (S); Simpson's Ranch, Sweetwater, May 1907, *K. Brandegee* (ANSP, CAS, G, M, P, US); Sweetwater Creek, 14–20 May 1907, *K. Brandegee* (C); Simpson's Ranch, Sweetwater Creek, 19 May 1907, *K. Brandegee* (C); Sweetwater Creek, 20 May 1907, *K. Brandegee* (C); Simpson's Ranch, Sweetwater Creek, 20–28 May 1907, *K. Brandegee* (C); Colfax Road, above Bear River, 2800 ft. alt., 23 May 1926, *L. S. Smith 1842* (CAS); AMADOR COUNTY—24 May 1886, *Curran* (C); 10 June 1889, *Greene* (C, ND); 1891, *Hansen* (C); Agric. Station (cultivated ?), 2000 ft. alt., May 1893.

*Hansen* 78 (C, M, OAC, P, S, US); near Jackson, 1600 ft. alt., 1-20 June 1904, *Mulliken* 109 (C, S); CALAVERAS COUNTY—Mokelumne Hill, *Blaisdell* (CAS, US); *Murphy's*, 17 May 1887, *B. H. Smith* (ANSP); Big Tree Grove, 23-25 July 1884, *Ball* (US); Calaveras Ranger Station, Stanislaus Forest, Avery, 1000 ft. alt., 26 May-8 June 1913, *Eggleston* 9132 (US); valley three miles west of Avery, 3100 ft. alt., 23 May 1921, *Tracy* 5713 (C); Angel's Camp, 11 April 1923, *Eastwood* 11655 (CAS); about 2½ miles east of *Murphy*, about 2800 ft. alt., 21 May 1927, *Stanford* 416 (CP); MARIPOSA COUNTY—*Whitlock's*, 16 May 1897, *Congdon* (C, S); Mt. Buckingham, 28 May 1898, *Congdon* (C); *Whitlock's*, 24 May 1903, *Congdon* (US); TUOLUMNE COUNTY—*Priest's*, 21 May 1899, *Congdon* (CAS, S); Sonora, 520 m. alt., 21 May 1913, *Eggleston* 9077 (US); Camp Baxter, 5500-5700 ft. alt., 30 June 1929, *Stanford* 1083 (CP); TULARE COUNTY—Giant Forest, 1908, *G. R. Hall* (P); SAN BERNARDINO COUNTY—7 Oaks Camp, San Bernardino Mts., 11-14 June 1901, *G. B. Grant* (S).

This species as originally delimited had a very limited longitudinal range in the lower altitudes of the Sierra Nevada. It has often been confused with *S. glaucescens*, but the longer stellate pubescence, non-glaucous surfaces, usually more erect habit, and form of leaves separate it from those glaucescent forms of higher altitudes. The type specimens of these two species are similar only in habit of growth.

*Sidalcea elegans* Greene, the type locality of which is Josephine County, Oregon, is conspecific with *S. asprella*, and therefore the range of this species is extended farther north. In some of the Oregon specimens, referable to *S. elegans*, the inflorescence is more slender, the leaves are mostly basal, and many of the plants are almost vine-like in habit.

#### 15. *S. robusta* Heller, n. sp.<sup>43</sup>

<sup>43</sup> *Sidalcea robusta* Heller, nov. sp., perennis; caule robusto, erecto, 9-12 dm. alto, glauco, glabro; foliis inferioribus orbiculato-cordatis, usque ad 6 cm. latis, 7-partitis, subtus cinereo-stellatis, segmentis cuneatis tri-lobatis et acuto-dentatis; foliis caulibus palmato-divisis in segmentis linearibus plus minusve integris; inflorescentia laxa racemosa usque ad 4.5 dm. longo; rhachiis, bracteis, pedicellis calyceque dense stellato-tomentosis; bracteis simplicibus, lanceolatis, acutis, lobis calycis ovato-lanceolatis, acuminatis, prominente tri-nerviis; corollis pallido-purpurascensibus usque ad 3 cm. longis; carpellis ignotis.—Collected along Chico Creek, 5 miles east of Chico, California, 17 May 1915, A. A. Heller 11879 (Herb. of A. A. Heller TYPE).

Perennial from an apparently creeping rootstock; stems stout, erect, 9–12 dm. high, simple or nearly so, often scape-like, somewhat glaucous, nearly glabrous or hirsute at the base, sparingly leafy; basal leaves orbicular-cordate, up to 6 cm. broad, parted almost to the base into about 7 more or less 3-lobed and sharply toothed cuneate segments, the upper surface with appressed simple or geminate hairs, the lower surface pale ashy gray with short stellate hairs, the petioles shortly stellate; cauline leaves parted almost to the base into lanceolate or linear, entire or slightly dentate segments, pubescence as for the basal leaves; inflorescence loosely racemose, up to 4.5 dm. long; rhachis, bracts, pedicels, and calyx densely stellate-tomentose; bracts simple, lanceolate, acute; calyx-lobes ovate-lanceolate, acuminate, prominently 3-nerved; petals pale lilac, turning dull or yellowish when dry, large, up to 3 cm. long, only slightly retuse; mature carpels not seen.

Type specimen: A. A. Heller 11879 in Heller Herbarium.

Distribution: on the bluffs above Chico Creek, near Chico, and in Berry Canyon near Clear Creek, Butte County, California.

Specimens examined:

CALIFORNIA: BUTTE COUNTY—*Fremont's 3rd Exped.* 356 (US); Chico Ranch, May 1879, *Bidwell* (G); 28 April, *Gray* (G); Little Chico Canyon, April 1896, *Austin* 822 (C, M, US); Little Chico Creek, May 1896, *Austin* 674 (M); Little Chico Creek, 5 June 1897, *Austin* 1920 (US); Little Chico, May 1898, *Bruce* 1920 (P); Forest Ranch, May 1898, *Bruce* 2390 (P); Chico, April 1899, *E. B. Copeland* (S); Berry Canyon, near Clear Creek, 8 May 1902, A. A. Heller & Brown 5496 (ANSP, F, G, M, P, S, US); volcanic uplands along Chico Creek, 5 miles east of Chico, 17 May 1915, A. A. Heller 11879 (CAS, F, G, M, OAC, US, COTYPES).

*Sidalcea robusta*, although conspicuously unlike the majority of specimens of *S. asprella*, nevertheless is very closely related to that species and may eventually be combined with it as a variety. In default of experimental work or transplants of this restricted group and because of the lack of mature fruits it can not at present be referred to *S. asprella*. Many similarities, however,



may be found between Butte County specimens and some of the collections from near Redding, Shasta County.

16. *S. glaucescens* Greene in Bull. Calif. Acad. Sci. 1: 77. 1885; Gray in Proc. Am. Acad. 22: 287. 1887; Greene, Fl. Francis. 106. 1891; E. G. Baker in Jour. Bot. 29: 52. 1891 (Synopsis Malveae, 31. 1894), excluding synonymy; Gray, Syn. Fl. N. Am. 1: 306. 1897, excluding synonymy; Howell, Fl. N. W. Am. 101. 1897, as to California specimens only; Jepson, Man. Fl. Pl. Calif. 631. 1925.

*S. montana* Congdon in Erythea 7: 183. 1900.

Perennial from a strong woody root, glaucous and seemingly glabrous throughout or with a sparse minutely stellate puberulence; stems several, slender, procumbent (often appearing vine-like) or erect, up to 7.5 dm. long; all leaves similar, 1-6 cm. broad; basal leaves deeply lobed or palmately parted; cauline leaves palmately 5-7-parted into narrowly cuneate, 3-5-lobed, or dentate segments, those of the uppermost leaves lance-linear and entire; inflorescence a slender loosely flowered raceme frequently 3 dm. long; bracts, pedicels, and calyx usually somewhat stellate-pubescent; bracts small, simple and subulate or deeply bifid; calyx-lobes attenuate, acuminate, becoming broadened at the base and much veined after anthesis; petals deep purple, obovate, entire, or retuse and denticulate; carpels large, reticulate, the reticulations somewhat elongated dorsally.

Distribution: higher Sierra Nevadas of California from the Lassen Butte region southward to Mariposa County.

Specimens examined:

CALIFORNIA: LASSEN BUTTE REGION—Battle Creek meadows, 22-26 Aug. 1912, *Eastwood 1919* (CAS, G, M, US); Morgans Springs, 22-26 Aug. 1912, *Eastwood 1757* (CAS, M, US); PLUMAS COUNTY—May 1877, *Austin* (M, US); Big Meadows, 25 July 1882, *Cleveland* (C); Prattville, 3 July 1892, *T. S. Brandegee* (C); Mt. Hough, 1760 m. alt., Aug. 1901, *Eggleston 7695* (US); July 1918, *Sutcliffe* (CAS); Greenville, 9 June 1920, *M. S. Clemens* (CAS); Quincy, 29 June 1920, *M. S. Clemens* (US); Forest Lodge, Greenville, 12 June 1927, *Eastwood 14504* (CAS); BUTTE COUNTY—Iron Canyon, May 1896, *Austin 133* (M, ND, US); on road from

Prattville to Chico, at Jonesville, 9 July 1897, *M. E. Jones* (P); summit east of Jonesville, 7000 ft. alt., 7 Aug. 1914, *A. A. Heller 11656* (C, CAS, G, M, OAC, S, US); SIERRA COUNTY—summit of Ebbetts Pass, 7 Sept. 1926, *Ferris 6846* (S); NEVADA COUNTY—Soda Springs, 27 July 1881, *M. E. Jones 2556* (P, S); Truckee, Aug. 1884, *Sonne 63* (M); Soda Springs, 27 July 1881, *M. E. Jones 2556* (P, S); near Summit Station, Donner Pass, 27 July 1903, *A. A. Heller 7047* (ANSP, C, G, M, P, S, US); Donner, Summit Station, 15 July 1908, *K. Brandegee* (C); Truckee, 2100–2600 m. alt., 15 June 1913, *A. E. Hitchcock 370* (US); Truckee River near Boca, 1913, *K. Brandegee* (C); PLACER COUNTY—Summit Valley, Aug. 1883, *Greene* (G, F); Summit, Aug. 1884, *Greene* (G COTYPE ?); Summit Station, Oct. 1887, *Parry* (M); road to Lake Tahoe, July 1888, *Sonne* (US); Truckee, canyon above Coldstream, 31 July 1892, *Sonne 42* (M); Aug.–Oct. 1892, *Carpenter 45* (C, US); 1893, *Hardy* (C, US); Summit, Sierra Nevada Mts., 7000 ft. alt., 26 July 1900, *M. E. Jones* (P); Tahoe Tavern, Lake Tahoe, 15 July 1906, *G. B. Grant 7068* (S); Cisco, 5940 ft. alt., 25 July 1908, *Walker 1388* (C); Cisco, 6000 ft. alt., 1 July 1910, *H. M. Hall 8732* (C, US); Old Cisco, along Yuba River, 5700 ft. alt., 11 July 1910, *H. M. Hall 8758* (S); Tahoe City, 15–19 June 1912, *Eastwood 466* (CAS, US); Summit, 9 Aug. 1913, *Smiley 452* (G); LAKE TAHOE REGION—31 Aug. 1872, *Redfield 40* (C, M); Lake Tahoe, 1 Aug. 1891, *W. H. Evans* (M); Lake Tahoe, June 1906, *G. B. Grant 1098* (C); Squaw Creek, 1909, *Eastwood 237* (CAS); Tahoe Camp, Lake Tahoe, 6800 ft. alt., 25 June 1928, *Munz 11091* (M); Mt. Tallac, Aug. 1906, *Eastwood 1021* (CAS, US); ALPINE COUNTY—Hermit Valley, 1877, *Hooker & Gray* (G); Hermit Valley, 8000 ft. alt., Aug. 1903, *Hall & Chandler 4772* (C); AMADOR COUNTY—Bear River, 5500 ft. alt., 30 Aug. 1896, *Hansen 1954* (M, S, US); CALAVERAS COUNTY—Big Trees, June 1889, *Greene* (C); Calaveras Big Tree Grove, 4 July 1891, *T. S. Brandegee* (C); near Big Tree Grove, Aug. 1906, *Dudley* (S); Salt Spring Reservoir, June 1923, *Steinbeck* (CAS); YOSEMITE NATIONAL PARK—Big Tree Road, near Camp 129, 30 July 1863, *Brewer 1949* (US); Crane Flat, 3 Sept. 1907, *Eastwood 725* (CAS); Tioga Road near Aspen Valley, 8 Aug. 1907, *Eastwood 167* (CAS, US); Tioga Road near Dark Hole, 7700 ft. alt.

23 Aug. 1916, *Smiley 884* (G); TUOLUMNE COUNTY—Williams Ranch, 14 June 1895, *Blasdale* (C); Pine Crest, 4 July 1926, *Pendleton* (OAC); MARIPOSA COUNTY—east of Minarets, alt. 11000 ft., 22 Aug. 1899, *Congdon* (C TYPE of *S. montana* Congdon); WITHOUT LOCALITY—near Donner Lake, 1865, *Torrey 54* (G); dry granite ledge, Black Rock Mts., 7000 ft. alt., 5 Aug. 1900, *Leiberg 5284* (US); near Bald Hill, 6000 ft. alt., 8 July 1900, *Leiberg 5061* (US); Sunnyside, 1909, *Eastwood 36* (CAS); near top of Bear Ridge, 7000 ft. alt., 23 July 1921, *Head* (CAS).

The range of *S. glaucescens* has previously been given<sup>43</sup> as extending to Victoria, British Columbia, and Antelope Island, Utah; however, the former plants are *S. Hendersoni* and the latter *S. neo-mexicana* or *S. oregana*. The plants from Victoria are mostly pistillate, bright green in foliage, and have no glaucescence, and thus are referable to *S. Hendersoni*.

The type specimen of *S. montana* of Congdon, although collected at 11,000 feet east of the Minarets in Mariposa County, from 3000–5000 feet above the usual range of *S. glaucescens*, undoubtedly belongs here, though H. M. Hall<sup>44</sup> placed it temporarily under *S. asprella*, at the same time questioning the relationship of *S. asprella* and *S. glaucescens*. The cut of the leaves, the laxly decumbent habit, glaucous appearance, and stellate puberulence are those of *S. glaucescens*. This therefore reduces the range of *S. asprella* as given by F. J. Smiley<sup>45</sup> in his discussion of plants of the boreal regions of the Sierra Nevada. Although these two species, *S. asprella* and *S. glaucescens*, have a somewhat similar longitudinal range, *S. glaucescens* occurs at higher altitudes than *S. asprella*, is glaucous (often minutely puberulent), and the leaf segmentation is more constantly similar. *Sidalcea asprella* extends farther coastward and northward.

17. *S. multifida* Greene in Cyb. Columb. 1: 34. 1914; Tidestrom in Contr. U. S. Nat. Herb. 25: 353. 1925. Pl. 12, fig. 1.

Caespitose perennial from a somewhat horizontal woody root, pale glaucous, and minutely stellate-puberulent throughout;

<sup>43</sup> Gray, Syn. Fl. N. Am. 1: 306. 1897.

<sup>44</sup> Hall, in Univ. Calif. Publ. Bot. 4: 200. 1912.

<sup>45</sup> Smiley, A report upon the boreal flora of the Sierra Nevada of California. Univ. Calif. Publ. Bot. 9: 265. 1921.

stems mostly several, slender, erect, up to 4.5 dm. high; leaves mostly basal, 1–5 cm. broad, all deeply 5–7-parted into 2–5-lobed cuneate segments, the lobes oblong to linear; uppermost cauline leaves similar but the segments mostly entire or linear; stipules lanceolate, ciliate; inflorescence few-flowered, racemose; rhachis, bracts, and pedicels minutely stellate-puberulent; bracts short, ovate, simple or bidentate or bifid; calyx densely close stellate-tomentose, lobes lanceolate, acuminate; petals purple, large, up to 2 cm. long, denticulate and retuse; carpels purplish, usually 5, delicately reticulate.

Distribution: vicinity of Reno and in the foothills of the Peavine Mts., Nevada.

Specimens examined:

NEVADA: WASHOE COUNTY—Reno, foothills, 6000 ft. alt., 9 June 1897, *M. E. Jones* (M, P, S, US TYPE); Reno, 4500 ft. alt., 8 June 1897, *M. E. Jones* (P); Peavine Mountains, 2 June 1909, *A. A. Heller 9716* (ANSP, G, S, US); Peavine foothills, near Reno, 8 June 1913, *K. Brandegee* (C); Reno, 1350–1500 m. alt., 18 July 1913, *A. E. Hitchcock 549* (US); STOREY COUNTY—near Virginia City, 1864, *Bloomer* (US); Virginia, 7000 ft. alt., June 1905, *McDermott 1514* (US); ORMSBY COUNTY—near Carson City, 1864, *Anderson 77* (G); on slopes, Callahan's ranch north of Carson City, 1650 m. alt., 16 July 1919, *Tidestrom 10562* (G, US); LANDER COUNTY—Galena Creek, 2400 m. alt., 17 July 1919, *Tidestrom 10569* (US); Galena Creek, 2400 m. alt., 17 July 1919, *Tidestrom 10571* (US).

This species may easily be confused with *S. glaucescens*, if specimens farthest from the type locality be examined. However, the caespitose habit, much more pedately parted leaves, the more upright, slender, scapiform stems, and large purple flowers readily separate it specifically from the more "trailing" forms of *S. glaucescens*. The contrast of glaucous leaves and purple flowers makes this one of the most beautiful species in the genus.

18. *S. pedata* Gray in Proc. Am. Acad. 22: 288. 1887; E. G. Baker in Jour. Bot. 29: 53. 1891 (Synopsis Malveae, 31. 1894); Gray, Syn. Fl. N. Am. 1<sup>1</sup>: 306. 1897. Pl. 12, fig. 2.

*S. spicata* Greene var. *pedata* (Gray) Jepson, Man. Fl. Pl. Calif. 630. 1925.

Subcaulescent perennial from a tuberous-thickened root, more or less purplish throughout; stems single or clustered, exceedingly short; leaves from the apex of the short stem, 1-5 cm. broad, sparsely or evidently hirsute on the petioles and both surfaces, all similar, pedately parted into narrow cuneate, 2-3-lobed segments, the lobes linear or oblong, entire; inflorescence subscapiform, up to 4.5 dm. long, 1-2-leaved and more or less hirsute, especially toward the base; raceme many-flowered, at length elongated; rhachis, short pedicels, and bracts sparsely and minutely stellate-pubescent; bracts simple, bidentate or bifid, subulate and ciliate; calyx-lobes lanceolate, becoming deltoid after anthesis; petals purple, small, narrow, 2-4 mm. wide, emarginate; carpels 5, dorso-laterally rounded, smooth and glabrous.

Stamineal phalanges indistinct, most of the stamens separate but those of the outer series combined more or less at base into threes or fours as in the subgenus *Malvastralcea*.

Distribution: wet places in the vicinity of Bear Valley, San Bernardino Mountains, San Bernardino County, California.

Specimens examined:

CALIFORNIA: SAN BERNARDINO COUNTY—wet places, Bear Valley, 6000 ft. alt., June 1886, *S. B. Parish* 1805 (C, P, G TYPE, ND, S); Stars Valley, June 1886, *S. B. Parish* (ND); Bear Valley, June 1892, *S. B. Parish* (ND); Bear Valley, 6000 ft. alt., 2 June 1892, *S. B. Parish* 2343 (C, F); Bear Valley, 6500 ft. alt., San Bernardino Mts., and their eastern base, June 1894, *S. B. Parish* (M, US); Bear Valley, San Bernardino Mts. and their eastern base, 6500 ft. alt., 19 June 1894, *S. B. Parish* 3172 (M, US); Bear Valley, about 6000 ft. alt., 16-20 June 1895, *S. B. Parish* 3783 (3753 ?) (C, CAS, G, ND); Bear Valley, 6600 ft. alt., 19 July 1900, *M. E. Jones* (P); Bear Valley, Aug. 1901, *Shaw & Illingsworth* 232 (S); Bear Valley, 3 Aug. 1902, *Abrams* 2875 (F, G, M, P); Deer Lick, Deep Creek Valley, 15 June 1906, *Reed* (F); Bear Valley, July 1909, *Davidson* 2176 (US); Metcalf Meadow, Bear Valley, 6500 ft. alt., 18 June 1916, *S. B. Parish* 10876 (C, S); Bear Valley, 1 June 1917, *Edwards* (P); Bear Valley, 6950 ft. alt., 23 May 1922, *Pierce* (P); low moist ground at east end of Bear Lake, Bear Valley, 6800 ft. alt., 10 June 1922,



*Munz 5654* (C, CAS, P); Bear Lake, 24 June 1926, *M. E. Jones* (CAS, S); damp meadow, Bluff Lake, 7400 ft. alt., 4 July 1926, *Munz 10600* (C, P); Baldwin Lake, 19 May 1927, *M. E. Jones* (C, P); San Bernardino Mts., June 1928, *Van Dyke* (CAS).

Restriction to the Bear Valley and Bear Lake region of San Bernardino County, the peculiar rose-purplish shading of colors in the inflorescence, small flowers, the multisect leaves, and the staminal column make this species very distinct. It may be considered the transition from the subgenus *Eusidalcea*, section *Perennes*, to the subgenus *Malvastralcea* because the stamens, although apparently distinct, are more or less united at the base into three's and four's.

#### SUBGENUS II. MALVASTRALCEA Roush

Subgenus II. MALVASTRALCEA Roush, new subgenus.

Suffruticose perennials with the habit of *Malvastrum*; leaves flabelliform (or reniform-orbicular), scarcely or not at all lobed or parted; bracteoles present; staminal column not conspicuously double, the outer series of stamens combined merely at the base into threes or fours. Sp. 19-19a.

#### KEY TO THE SPECIES

- Pubescence long, soft, stellate; inflorescence loose, few-flowered; bracts lanceolate, small.....19. *S. Hickmani*  
 Pubescence short, rough, stellate; inflorescence congested, many-flowered; bracts broadly ovate, acuminate, large.....19a. *S. Hickmani* var. *Parishii*

19. *S. Hickmani* Greene in *Pittonia* 1: 139. 1887; Fl. Francis. 104. 1891; E. G. Baker in *Jour. Bot.* 29: 52. 1891 (Synopsis *Malveae*, 31. 1894); Gray, *Syn. Fl. N. Am.* 1<sup>st</sup>: 307. 1897; Jepson, *Man. Fl. Pl. Calif.* 631. 1925.

Suffruticose perennial from a long woody root, habitally like *Malvastrum*; stems several, up to 4 dm. high, leafy and soft stellate-pubescent throughout; leaves flabelliform or reniform-orbicular, 1-5 cm. broad, crenate, dentate or slightly lobed, with long, soft-stellate pubescence; basal leaves smaller than the middle cauline leaves; stipules narrowly lanceolate or subulate, small, ciliate; inflorescence loosely racemose, few-flowered; rachis, pedicels, bracts, and calyx densely stellate-villous or stellate-

tomentose; bracts narrowly linear or short and lanceolate, long-ciliate; bracteoles 3, similar to the bracts; calyx membranous or herbaceous, the lobes deltoid, abruptly acute or long-acuminate; petals rose-purple in pistillate flowers, barely 5 mm. long, paler and at least 15 mm. long in the perfect flowers, twisted in drying as in *Sphaeralcea*; carpels glabrous and smooth except for a few transverse wrinkles which may or may not reach the dorsal midvein.

Distribution: Marin and Monterey Counties, California.

Specimens examined:

CALIFORNIA: MARIN COUNTY—Big Carson Ridge, May 1925, Sulliffe (CAS); Big Carson Ridge, in burnt area, 7 June 1925, Eastwood 12995 (CAS, G, P); MONTEREY COUNTY—Reliz Cañon, 1887, Hickman (C, ND TYPE); Tassajara Hot Springs, June 1901, Elmer 3235 (S).

This species and its variety *Parishii* show the most discontinuous distribution in the genus. The species occurs in Monterey and Marin Counties, and the variety occurs only on the west slopes of the San Bernardino Mountains. Future collections may show its occurrence in the intervening area. There is considerable variation within the species, as shown by a comparison of the type with *Eastwood No. 12995*, in which the pubescence is shorter, the bracts smaller, and the calyx lobes are neither as thin nor so acuminate. There is also a tendency in the latter collection toward a lobing of the leaves.

19a. Var. *Parishii* Rob. in Gray, Syn. Fl. N. Am. 1<sup>1</sup>: 307. 1897; Jepson, Man. Fl. Pl. Calif. 631. 1925.

Pl. 5, fig. 6; pl. 6, fig. 7; pl. 13, fig. 1

*S. Hickmani* Greene in Erythea 4: 65. 1896, not of Pittonia 1: 139. 1887.

*S. Parishii* Rob. acc. to Davidson & Moxley, Fl. So. Calif. 231. 1923.

*Malvastrum confertum* Parish acc. to Jepson, Man. Fl. Pl. Calif. 631. 1925, in synonymy.

Pubescence short, rough, stellate; stipules ovate-acuminate; inflorescence congested, spicate, many-flowered except in the *ecads*; bracts broadly ovate, large, ciliate; bracteoles similar or narrowly lanceolate; calyx-lobes ovate, long-acuminate.

Distribution: San Bernardino Mts., California, between 4600 and 7000 ft. altitude.

Specimens examined:

CALIFORNIA: SAN BERNARDINO COUNTY—near Seven Oaks, at 6000 ft. alt., and western slope of Mt. San Bernardino, about 7000 ft. alt., 25 June 1895, *Parish 3786* (C, CAS, G TYPE, ND); Forsee (Foxesee) Creek, and near Seven Oaks, at 6000 ft. alt., 25 June 1895, *Parish 3925* (G, M, SCW); Seven Oaks Camp, 11 June 1901, *Grant 4026* (S); Yucaipa Mts., 4600 ft. alt., 25 June 1909, *F. M. Reed 2755* (C); road crossing Foxesee Creek, 5500 ft. alt., 26 Aug. 1920, *Peirson 2251* (P); Foxesee Creek, dry soil in small clearing, at 6000 ft. alt., 24 June 1922, *Peirson* (P); Foxesee Creek, occasional on dry roadside bank, 5500 ft. alt., 27 Aug. 1922, *Munz 6339* (C, P); recent burn in chaparral, 1 mi. west of Barton Flats, at 5500 ft. alt., 17 July 1924, *Munz & Johnston 8660* (C, P).

This variety is undoubtedly the result of isolation. Although extremely variable, this variation seems to reach its greatest development in two *ecad* forms: *Munz and Johnston No. 8660*, from a burned-over chaparral, is a low suffrutescent *ecad* with a strong tap-root and few, large, lighter-colored flowers, mostly occurring in the leaf axils. This form is due, doubtless, to exposure and little, or deep-seated, moisture. The second *ecad*, represented by *Peirson No. 2251* and *Munz No. 6339* from Foxesee (Forsee) Creek, is probably from a less-exposed place with more available moisture and richer soil. The vegetative growth of the latter *ecad* is conspicuously elongated, the leaves are large and thin, and less puberulent; the inflorescence is also elongated, almost no flowers develop, and the bracts are long and abundant. All gradations from the type to these two *ecads* are shown in the specimens cited.

SUBGENUS III. HESPERALCEA (Greene) Jepson

Subgenus III. HESPERALCEA (Greene) Jepson, Fl. West. Mid. Calif. 239. 1901, and ed. 2. 258. 1911; Man. Fl. Pl. Calif. 628. 1925.

§ *Hesperalcea* Greene, Fl. Francis. 106. 1891.

*Hesperalcea* Greene in Pittonia 2: 301. 1892; E. G. Baker, Synopsis Malveae, Suppl. 109. 1894.

Suffruticose perennials, habitally unlike any other members of the genus; stems several from a strong woody root, stout and ligneous at the base, leafy and hispidulous, or stellate-hirsute; leaves vitiform; inflorescence glomerate or densely spicate, single or paniculately disposed; calyx accrescent; petals white, deeply notched; stamens few, the outer series apparently separate but usually 2-3-parted, each lobe 1-3-antheriferous. Sp. 20.

20. *S. malachroides* (H. & A.) Gray in Proc. Am. Acad. 7: 332. 1868; Brew. & Wats. Bot. Calif. 1: 83. 1876; Greene in Bull. Calif. Acad. Sci. 1: 80. 1885; Gray in Proc. Am. Acad. 22: 286. 1887; Greene, Fl. Francis. 106. 1891; E. G. Baker in Jour. Bot. 29: 51. 1891 (Synopsis Malveae, 30. 1894); Gray, Syn. Fl. N. Am. 1: 307. 1897; Jepson, Fl. West. Mid. Calif. 241. 1901, and ed. 2. 260. 1911; Man. Fl. Pl. Calif. 631. 1925.

Pl. 5, figs. 7, 8; pl. 6, fig. 8; pl. 13, fig. 2

*S. vitifolia* Gray in Proc. Am. Acad. 7: 332. 1868; E. G. Baker in Jour. Bot. 29: 51. 1891 (Synopsis Malveae, 30. 1894) (a form with leaves more angulately lobed, shorter and rougher stellate pubescence).

*Malva malachroides* Hook. & Arn. Bot. Beech. Voy. Suppl. 326. 1840; Torr. & Gray, Fl. N. Am. Suppl. 1: 681. 1840; Walp. Rep. 1: 294. 1842; Gray in Mem. Am. Acad. N. S. 4: 16. 1849 (Pl. Fendl. 16. 1849).

*Hesperalcea malachroides* Greene in Pittonia 2: 301. 1892; E. G. Baker, Synopsis Malveae Suppl. 109. 1894.

Perennial; stems several from a strong woody root, erect, up to 1 m. high, stout, leafy-branched above, stellate-hirsute or hispidulous on all younger parts; leaves vitiform, 2-20 cm. broad, palmately veined and lobed, lobes more or less coarsely dentate, upper surface appressed geminate-hirsute, lower surface stellate-hirsute; stipules purplish, lanceolate, membranous, ciliate; inflorescence glomerate or densely spicate, singly or paniculately disposed; rhachis, peduncles, and pedicels geminate- to stellate-hirsute; bracts purplish, simple or bifid, filiform or subulate, ciliate; calyx stellate-tomentose and hirsute, accrescent, mem-

branous and veiny when mature, the lobes often purple at the apex, ovate-lanceolate, acute; petals white, often purplish, oblique, elongate, narrow with a long claw, deeply notched; flowers gynodioecious, outer staminal phalanges of the perfect flowers 2-3-parted at the summit of the slender column, carpels sometimes present; pistillate flowers about one-third as large as the perfect ones, column short, truncate with few or no anthers; anthers often a delicate heliotrope; carpels dark, 7-9, orbicular-reniform, small, smooth and glabrous, with a prominent dorsal rib when mature.

Distribution: along the coast from southern Oregon to Monterey County, California.

Specimens examined:

OREGON: trail from Ralph's Place to Pistol River, Curry Co., 19 June 1929, *Leach 2421* (O).

CALIFORNIA: HUMBOLDT COUNTY—Redwood Creek, 1878, *Rattan* (S); Mad River, 30 June 1883, *Rattan* (S); 1886, *Marshall* (ND); near Arcata, 8 July 1888, *Chesnut & Drew* (C); Eureka, 17 June 1893, *Blankinship* (C, G); Camp Grant, 13 June 1899, *Davy & Blasdale 5482* (G, P, S, US); Englewood Prairie, 13 June 1899, *Davy 5482* (C); Eureka, 0-500 ft. alt., 4 July 1909, *Tracy 3010* (C); Eureka, 22 May 1910, *Tracy 3141* (C, US); Eureka, 30 June 1912, *Tracy 3716* (C, US); Holmes Flat, 1 July 1918, *Tracy 4964* (C); Eureka, 22 May 1921, *Piper* (CAS); Horse Mountain cut-off, 16 May 1926, *Kildale 1837* (S); Lord-Ellis road, 2 July 1927, *Kildale* (S); MENDOCINO COUNTY—Bear Harbor, 1867, *Bolander 6473* (G TYPE of *S. vitifolia* Gray, M, US); Westport, 19 June 1890, *K. Brandegee* (C); Point Arena, 7 July 1892, *Michener & Bioletti 423a* (C); Darle Gulch below Mendocino City, 11 Aug. 1901, *Congdon* (US); Darle Gulch, south of Mendocino, 12 Aug. 1901, *Congdon* (S); Comptche, May 1903, *McMurphy 161* (S); Inglenook Woods, 16 July 1904, *Congdon* (C, M); Gualala River near Mendocino-Sonoma line, 3 July 1920, *Abrams 7604* (S); Westport, 9 July 1923, *Peirson 3774* (P); near Westport, June 1927, *Mrs. E. C. Suttiffe* (CAS, P); MONTEREY COUNTY—May-28 June 1893, cultivated at Berkeley (C); near San Francisco, 1868-69, *Kellogg & Harford 106* (M, ND, US); 1-5 May 1904, *Hall 4856* (US); Santa Lucia Mts., 15 June 1893,



*Eastwood* (US); Slate's near Sur River, 15 June 1893, *Eastwood* (C); Sur Post Office, Mill Creek, May-June 1901, *Davy* 7301 (C); Rocky Creek, 4 May 1925, *Ballou* (S); *Bryant* (S); *Abbott* (G); WITHOUT LOCALITY—Nova Californica, 1833, *Douglas* (G TYPE); *Coulter* 107 (G); *Anderson* (G); 1860-67, *Brewer* (US); 1869, *Gray* (G); 1872, *Anderson* (*Bolander*) (G); 1875, *Vasey* (US); 18—, *Biolletti* (ND).

Dr. E. L. Greene<sup>46</sup> first made this species a section *Hesperalcea* under *Sidalcea*, then later<sup>47</sup> raised it to generic rank because of its habit, leaf-form, inflorescence, and the cotyledons being abruptly contracted at the base, instead of cordate as in other species. In the most mature seeds available from specimens of *S. malachroides* no very definite evidence was found that the cotyledons are much less cordate than in other species of the genus, although they are more elongate and narrower. This condition is true for all other floral parts and particularly prominent in the petals which are very narrow with a long claw. In the staminal column there is no indication of the two series of phalanges. Although apparently separate, the few stamens are combined into sets, the outer series mostly 2-3-cleft. Jepson<sup>48</sup> made *Hesperalcea* a subgenus of *Sidalcea*, and although not like other members of the genus in habit the detailed characters are sufficient reason for retaining it in this category.

When Dr. Gray<sup>49</sup> transferred *Malva malachroides* to *Sidalcea* he also described another species, *S. vitifolia*, founded on *Bolander* No. 6473. This form has more angulately lobed leaves, shorter and harsher pubescence, but otherwise is the same as the species.

Specimens cultivated at the University of California from May-June 1893 (C No. 18693, 18694) have leaves 24 cm. broad and a very large and dense inflorescence. If compared with other specimens of this group the influence of habitat may be seen to be a potent factor for variation in size.

<sup>46</sup> Greene, Fl. Francis. 106. 1891.

<sup>47</sup> Greene in Pittonia 2: 301. 1892.

<sup>48</sup> Jepson, Fl. West. Mid. Calif. 239. 1901.

<sup>49</sup> Gray in Proc. Am. Acad. 7: 332. 1868.

## HORTICULTURAL FORMS

The following species are reported<sup>50</sup> as cultivated but no specimens were available for examination and the descriptions do not apply to the species as delimited in this study:

- S. atropurpurea* Hort.  
*S. campestris* Greene.  
*S. malvaeflora* var. *atropurpurea* Hort.  
*S. malvaeflora* var. *Listeri* Hort.  
*S. mariana* Hort.  
*S. mexicana* Hort.

## SPECIES MIHI IGNOTAE

- Sidalcea atacosa* Buckl. in Proc. Acad. Sci. Phil. 13: 161. 1862=  
*Sphaeralcea pedatifida* Gray, Syn. Fl. N. Am. 1<sup>1</sup>: 314. 1897,  
 fide Gray.  
*Sidalcea nodosa* Turcz. in Bull. Soc. Nat. Mosc. I, 36: 566. 1863.  
*Sidalcea peruviana* Turcz., *ibid.*  
*Sidalcea triloba* Turcz., *ibid.*

## LIST OF EXSICCATAE

The distribution numbers are printed in *italics*. Unnumbered collections are indicated by a dash. The numbers in parentheses are the species numbers used in this monograph.

- Abbott, E. K. — (12); — (20).  
 Abrams, L. R. 6981, 7498 (1); 7617 (3);  
     8917 (6); 4772, 8761, 9616, 9676 (7);  
     732, 9748, 9560 (8); 8716 (9); 3257,  
     3257a (11a); —, 1128, 1436, 1602,  
     2302, 3311, 3740, 3831, 3832, 4225,  
     6424, 6429, 6921 (12); 2860 (13); 6193,  
     8506 (14); 2875 (18); 7604 (20).  
 Abrams, L. R. & G. T. Benson, 10245,  
     10424 (14).  
 Aiton, G. B. 62, 1344 (8).  
 Alderson, R. D. — (12).  
 Ames, M. E. P. — (4).  
 Anderson, C. L. 77 (17); — (Bolander,  
     H. N.) (20).  
 Angier, B. S. —, 90 (12).  
 Antisell, T. 30 (12).  
 Applegate, E. I. 58 (8); 2386 (8a); 2568  
     (14).  
 Arsène, Bro. G. 18632, 18879 (11).  
 Atkinson, W. A. — (1); — (12).  
 Austin, Mrs. R. M. —, 139, 1921 (1);  
     1924 (2); —, 132 (3); —, 132, 1873,  
     1922, 11467, (4); —, 4, 209, 1408, 1659  
     (7); —, 417, 1660, 2205 (8); 674, 822,  
     1920 (15); —, 133 (16).  
 Austin, Mrs. R. M. & Mrs. C. C. Bruce,  
     1659 (7); 2205 (8).  
 Bacigalupi, R. 1558 (1); 1152 (12).  
 Bacigalupi, McMunn & Mason, 1499 (4).  
 Bailey, V. 552a (5).  
 Bailey, W. W. 192 (7).  
 Baker, C. F. 2931 (1); 2869, 2877, 2963  
     (4); —, 670, 800, 9180 (5); —, 1168

<sup>50</sup> Hubbard in Bailey, Stand. Cyc. Hort. 6: 3162. 1917; Bailey, Man. Cult. Pl. 486. 1924.

- (7); 4255 (Coll. Culbertson), 4318 (Coll. Culbertson) (7a); —, 360, 440, 461 (11); —, 275, 611 (12).
- Baker, C. F., F. S. Earle & S. M. Tracy, 679 (5); 887 (11).
- Baker, M. S. —, 2537 (1); —, 493 (3); —, 148, 338, 2343, 5203c (7); — (12).
- Baker, M. S. & F. Nutting, — (1).
- Ball, J. — (14).
- Ballou, F. O. — (20).
- Barber, E. A. — (5).
- Barber, J. H. — (1); — (12).
- Barber, M. A. 80 (8a).
- Beardslee, H. C. —, 102 (11).
- Bentley, G. — (4).
- Beschle, Flora — (5).
- Bereman, Mrs. 915 (12).
- Berg, N. N. — (12).
- Bethel, E. — (4); — (14).
- Bidwell, Mrs. J. — (2); — (4); — (15).
- Bigelow, J. M. — (1); — (2); — (4); — (12).
- Biltmore Herb. 3486a (Colo. Exp. 1-684) (5).
- Bioletti, F. T. — (1); — (12); — (20).
- Black, L. A. M. — (7); 67 (8).
- Blaisdell, F. E. — (4); — (14).
- Blankinship, J. W. — (1); — (4); — (8); — (12); — (14); — (20).
- Blasdale, W. C. 1022 (1); — (7); — (12); — (16).
- Blockman, I. M. — (12).
- Bloomer, H. G. — (17).
- Blumer, J. C. 119 (11).
- Bolander, H. N. 4813 (1); 6265 (7); 12 (12); —, 4898 (13); 6473 (20).
- Booth, Mrs. — (7).
- Bowen, W. J. 13 (8).
- Bowman, A. M. 55 (1).
- Bradshaw, R. V. 1496 (10).
- Brandegee, K. — (1); — (3); — (4); — (7); — (7a); — (12); — (13); — (14); — (16); — (17); — (20).
- Brandegee, T. S. —, 124 (5); — (7); — (7a); —, 690 (8); 793 (11); — (12); — (12a); — (13); — (14); — (16).
- Braunton, E. 182 (12).
- Breninger, G. F. — (11).
- Brewer, W. H. 1860 (7); 280, 667, 1002 (12); 337 (12a); 1949 (16); — (20).
- Bridges, T. 40 (12).
- Brown, C. L. — (7).
- Brown, H. E. 215 (1); 193½ (4); 357 (7); 815 (12).
- Browne, A. C. — (12).
- Bruce, Mrs. C. C. 1921 (1); 193, 693, 1924 (2); 1873, 1922, 1923 (B), 2389 (4); 1920, 2390 (15).
- Bryant, W. E. — (20).
- Bush, — (12).
- Butler, G. D. 905, 1643, 1728 (7); 768, 1408 (8).
- Cain, B. C. 72 (7).
- Campbell, M. L. — (1).
- Cannon, E. — (12).
- Carlton, E. C. & A. O. Garrett, 6694 (11).
- Carlson, J. — (12).
- Carpenter, A. M. — (7); — (16).
- Carruth, W. W. — (1).
- Carter, W. R. —, 376 (6).
- Cary, M. 116 (5); 12 (11).
- Cassidy, Prof. — (5).
- Cernman, Mrs. — (12).
- Chandler, H. P. 7567 (4); 1707 (7); —, 214, 318, 529, 713, 1020, 5157 (12); 1438, 1466 (14).
- Chesnut, V. K. & E. R. Drew, — (7); — (13); — (20).
- Clark, C. F. — (1).
- Clark, J. A. 185 (8).
- Claypool, E. V. — (6).
- Clemens, Mrs. J. — (5); — (11).
- Clemens, M. S. — (6); — (7); — (9); — (16).
- Clements, F. E. & E. S. Clements, 6 (12).
- Cleveland, D. — (12); — (16).
- Clokey, I. W. 3175 (5); 2995 (11).
- Cockerell, T. D. A. — (5).
- Coghill, G. E. 69 (5).
- Coleman, I. — (12).
- Collins, G. N. & J. H. Kempton, 149 (12).
- Condit, I. J. — (12).
- Congdon, J. W. — (1); — (3); — (4); —, 21 (7); —, 14, 27 (13); — (14); — (16); — (20).
- Constance, L. 9685 (8).
- Coombs, A. L. — (7).
- Copeland, E. B. 3322 (7); 23 (7a); — (15).

- Copeland, H. F. 202 (7).  
 Cotton, J. S. 1330, 1652 (8).  
 Coues, E. & E. Palmer, —, 221 (11).  
 Coulter, J. M. — (5).  
 Coulter, T. 107 (20).  
 Coville, F. V. 578 (8).  
 Coville, F. V. & E. I. Applegate, 37 (7).  
 Coville, F. V. & F. Funston, 1462, 2103 (7a); 954, 1004 (11b).  
 Coville, F. V. & J. B. Leiberger, 45, 66, 205 (7).  
 Cowen, J. H. — (5); 82 (11).  
 Craig, T., V. Newsom, & M. Hilend, 337 (12).  
 Cramer, C. L. — (8).  
 Crandall, C. S. —, 81, 107, 201, (5); —, 108 (11).  
 Crawford, D. L. — (7a).  
 Cronkhite, H. M. 82 (7); 61 (8).  
 Culbertson, see C. F. Baker.  
 Cummings, C. E. — (11a); — (12).  
 Curran, M. K. — (1); — (3); — (4); — (7); — (14).  
 Cusick, W. C. 1668, 2053 (7); —, 1456, 2165, 2331 (8).  
 Daniels, F. 162 (5).  
 Davidson, A. 1716 (7a); — (12); — (13); 2176 (18).  
 Davis, D. D. — (12).  
 Davy, J. B. 1121, 1330 (1); 6730 (3); 2255, 2336 (11a); 51, 1024, 1101, 2631 (12); 1505 (13); 5482, 7301 (20).  
 Davy, J. B. & W. C. Blasdale, 5463 (1); 5482 (20).  
 Detling, R. E. 281 (7).  
 Douglas, D. — (1); — (9); — (12); — (20).  
 Drew, E. R., see V. K. Chesnut; — (1); — (12).  
 Dudley, W. R. — (1); — (7); —, 598, 914, 915, 1721, 1722, 1963, 2303, 2350, 2392, 3013 (7a); — (12); 1190 (13); — (14); — (16).  
 Dudley, W. R. & F. H. Lamb, 4450 (11a); 4728 (12).  
 Duncan, C. D. 155 (12).  
 Duncan, W. B. — (4); — (7a).  
 Dunn, G. W. — (12).  
 Durden, Mrs. — (14).  
 Dutton, H. A. — (1).  
 Earle, F. S. — (11).  
 Eastwood, A. 3319, 4586, 12713, 12794, 15158, 15161, 15225 (1); 4392 (2); — (3); —, 602, 10516, 12665, (4); 12 (5); 62, 1098, 1098a, 1216, 1888, 7821, 7822, 10766, 10964 (7); 13151, 13171, 13390 (8); —, 13, 5919 (11); —, 25, 82, 329, 830, 1608, 2492, 2862, 3244, 9132, 9183, 9195, 9462, 10460, 11807, 13717, 13798, 11465, 14310 (12); 20, 4976 (12a); —, 617, 671, 704, 754, 952, 1101, 1115, 6692, 10805, 10977, 11655, 11833, 12080, 12226 (14); 36, 167, 237, 466, 725, 1021, 1919, 14504, 1757 (16); 12995 (19); — (20).  
 Edwards, — (18).  
 Eggert, H. — (9).  
 Eggleston, W. W. 9101 (3); 5868, 10372, 11716, 11958a, 15233 (5); 7031, 7420, 11656 (7); 11338, 12124a, 12698 (8); 5943, 17095 (11); 9077, 9132 (14); 7695 (16).  
 Elder, J. S. 7, 70, 168 (7).  
 Ellis, C. C. 214 (5); 244 (11).  
 Elmer, A. D. E. 4316 (1); 4936 (3); —, 321, 1346 (8); 3569, 4637 (12); 3767 (12a); 3235 (19).  
 Engelmann, G. — (7); — (11).  
 Engelmann, H. — (8).  
 Epling, C. C. — (8); 5322, 5611 (10); 5197, 6224, 6292 (12).  
 Epling, C. C. & M. Houck, 9186, 9187, 9652 (8).  
 Epling, C. C. & H. Offord, 8775, 8777 (8).  
 Evans, H. M. — (7).  
 Evans, W. H. — (7); — (16).  
 Evermann, B. W. — (11); — (12).  
 Faunt le Roy, S. — (4).  
 Fendler, A. 80 (5); 79 (11).  
 Fernow, B. E. — (11).  
 Ferris, R. S. —, 842, 4148 (1); 1279 (11); 1972 (12); 6846 (16).  
 Ferris, R. S. & R. Duthie, 155, 1062 (7); 35, 154, 720, 843, 1246 (8).  
 Feudge, J. B. 815, 1159 (12).  
 Finley, R. C. — (9).  
 Fletcher, — (6).  
 Fossler, J. J. — (11).  
 Foster, A. S. 801 (6).

- Fremont's Exp. 432 (1); —, 410 (5); — (11); —, 418 (12); 356 (15).  
 Fritchey, J. Q. A. 24 (12).  
 Gabrielson, I. — (8).  
 Gageby, S. — (8).  
 Garcia, P. I. 321 (11).  
 Gardner, N. L. — (6).  
 Garrett, A. O. 2287 (5); 540, 1014, 1853, 2289, 3410, 5434 (8); —, 2303a, 2762, 2793, 2803a, 2820, 3501c (11).  
 Garrison, A. W. 37 (8).  
 Getty, F. — (10).  
 Gibbons, W. P. 117 (12).  
 Gilbert, H. C. 875 (7); 877 (9); 874 (10).  
 Gilkey, H. M. 59 (10).  
 Goldman, E. A. 176 (11).  
 Goodding, L. N. —, 2120 (5); 527, 570, 1091, 1627, 1747 (11).  
 Gorman, M. W. 443 (7); —, 4124 (9).  
 Grant, G. B. —, 5216a, 7072 (7); 1201, 1974 (7a); 475, 2004, 2716, 3507, 6172, 6850, 9190 (12); 5452 (12a); —, 5144 (14); 1098, 7068 (16); 4026 (19a).  
 Grant, J. M. — (6).  
 Gray, A. — (2); — (4); — (12); — (12a); — (15).  
 Greene, E. L. — (4); —, 885a (7); 885 (8); 31, — (11); — (12); — (14); — (16); — (20).  
 Gregg, J. 291, 718 (11).  
 Gregory, Mrs. — (12).  
 Griffin, L. H. — (10).  
 Griffiths, D. 5259 (11).  
 Griffiths, D. & J. S. Cotton, 534 (8).  
 Grinnell, F. —, 86, 87 (12).  
 Gross, C. A. — (14).  
 Haley, G. — (7).  
 Hall, E. 71, in part (7); 71, in part (10); 71, in part (14).  
 Hall, E. & J. P. Harbour, 85 (5); 18 (11).  
 Hall, G. R. — (14).  
 Hall, H. M. 8688, 9586, 12136 (7); —, 468, 674, 739, 3196, 4852, 6503 (12); 1325, 11809 (13); 8732, 8753 (16); 4856 (20).  
 Hall, H. M. & H. D. Babcock, 4272 (7); 5176, 5208, 5434 (7a).  
 Hall, H. M. & H. P. Chandler, 166 (13); 4772 (16).  
 Hall, H. M. & M. F. Essig 242 (10163) (14).  
 Hall, H. M. & G. R. 8362, 8372a, 8372b, 8404, 8481 (7a).  
 Hammond, E. W. 59 (14).  
 Hannibal, E. — (3).  
 Hansen, G. 1671 (3); —, 507, 508 (4); 505 (7); 241 (11); —, 506 (13); —, 78 (14); 1954 (16).  
 Hardy, Mrs. M. M. —, (16).  
 Harper, S. A. & E. T. — (11).  
 Harrison, G. J. 4861 (11).  
 Hartweg, T. 1668 (267) (1); 1667 (2); 1669 (4); 1666 (12).  
 Harwood, R. D. & Munz, P. A. 7166 (12).  
 Hasse, H. E. — (11a); —, 22 (12).  
 Hatch, D. W. — (9).  
 Hawver, E. P. — (1).  
 Hawthorne, J. C. & F. E. Blaisdell, F. E. — (7).  
 Hayden, F. V. — (11).  
 Head, A. — (7); — (16).  
 Heap, J. — (12).  
 Heckner, J. H. — (7).  
 Hedgecock, G. G. — (5).  
 Heermann, A. L. — (11a).  
 Heller, A. A. 11336 (1); 10751 in part, 11871, 13937, 14362 (2); 10751 in part, 11225, 11381 (3); —, 11298, 12675, 13198, 13934, 14366 (4); 6047, 6898, 9731, 11645, 12474, 14446, 14647, 14650 (7); 391, 10172 (8); 9016 (11); —, 6567, 7830 (12); 7876, 7987, 8105, 11898, 12423, 12744, 13189 (14); 11879 (15); 7047, 11656 (16); 9716 (17).  
 Heller, A. A. & H. E. Brown, 5412, 5414, 5452 (1); 5557 (2); 5212 (4); 5227, 5235 (12); 5496, 11879 (15).  
 Heller, A. A. & E. G. 3260 (8).  
 Heller, A. A. & P. B. Kennedy, 8669 (7).  
 Henderson, L. F. 1413, 11360 (6); —, 151, 7234, 7235 (7); —, 2433, 2436, 2437, 3106, 5402, 5631, 8556, 8857, 8858, 8862 (8); —, 12, 13, 24, 25, 150, 11356 (9); —, 27, 149, 5998, 7233, 10149, 11357 (14).  
 Henry, J. K. — (6).  
 Henshaw, H. W. 121 (12).



- Hickman, J. B. — (19).  
 Hill, E. K. — (4).  
 Hillman, F. H. — (7).  
 Hitchcock, A. E. 274 (7); —, 696, 981, 1356½ (11); 370 (16); 549 (17).  
 Hitchcock, A. S. — (7).  
 Holder, W. 2537 (12).  
 Hollick, A. — (1); — (4).  
 Hooker, J. D. & A. Gray — (16).  
 Hopping, R. 177 (13).  
 Horner, R. M. 106, 106B, 115 (8).  
 House, H. D. 4335 (14).  
 Howard, J. R. — (7).  
 Howell, J. T. 2365 (3).  
 Howell, T. (J.), 734 (6); 606, 1100 in part (7); —, 732, 735, 1100 in part, 1101 (8a); —, 614, 1492 (9); —, 680 (10); —, 603, 733 (14).  
 Hoyt, J. W. 71 (12).  
 Hubby, F. W. 28, 67 (12); 8 (12a).  
 Hull, W. A. 428 (8).  
 Hunt, Mrs. Clara, — (1).  
 Jackson, B. R. — (1).  
 Jaeger, E. C. —, 186 (12).  
 Jardine, J. T. 310 (8).  
 Jepson, W. L. — (1); 1174 (3); — (7); — (12).  
 Jessel, M. S. — (13).  
 Johnson, O. B. 243 (7).  
 Johnston, I. M. 1127 (11a); —, 5428, 5441 (12).  
 Jones, A. J. — (5).  
 Jones, H. — (8).  
 Jones, M. E. — (1); — (3); — (4); —, 679, 2139, 6039f (5); —, 2433 (7); — (7a); —, 5597, 6207, 6208 (8); —, 2182, 3993, 5976b, 5627a, 5983a (11); — (11b); —, 3157 (12); 6209 (13); — (14); —, 2556 (16); — (17); — (18).  
 Jones, V. — (7).  
 Jones, W. W. 133 (4); — (8); 412 (11); 131 (12); 130 (14).  
 Keck, D. & McCully, 132 (12).  
 Kelley, D. — (12).  
 Kellogg, A. & W. G. W. Harford, 111 (1); 110 in part (2); 110 in part (7); 109 (9); 108 (12); —, 106 (20).  
 Kellogg, W. — (11a); — (12).  
 Kelly, Mrs. G. Earle — (1).  
 Kennedy, P. B. 1420 (7); 435, 564, 837, 4395, 4529 (8); 673, 811, 4126 (11).  
 Kennedy, P. B. & S. B. Doten, 109, 411 (7).  
 Keyes, E. — (7).  
 Kildale, D. K. 1188 (7); 803, 1603, 3727 (12); 2280 (14); —, 1837, 3628 (20).  
 Kincaid, T. — (9).  
 King, A. M. — (1); — (7); — (12).  
 Kramer, A. H. — (7).  
 Krautter, 62 (3).  
 Lamb, F. H. 1218 (6).  
 Lathrop, L. M. — (7).  
 Lawrence, W. E. 318 (8); 1719 (10).  
 Leach, Mr. & Mrs. J. R. 2422 (14); 2421 (20).  
 Leeds, B. F. — (1).  
 Leiberg, J. B. 483, 2657 (7); —, 536, 1140, 2300 (8); 5843 (11); 3248 (12); 4098 (14); 5061, 5284 (16).  
 Leidy, J. — (8).  
 Lemmon, J. G. 2646 (11).  
 Lemmon, Mr. & Mrs. J. G. — (11).  
 Leonard, F. E. — (11).  
 Little, E. E. & E. M. Stanton, — (Pammel 168) (11).  
 Lorraine, L. — (7).  
 Luedinghaus, E. — (9).  
 Lunell, J. —, 5516 (9).  
 Lyall, D. — (6).  
 Lyon, W. T. — (11a).  
 Macbride, J. F. 165, 412, 1639 (8).  
 Macbride, J. F. & E. B. Payson, 3307 (8).  
 McDermott, Mrs. L. — (17).  
 MacDougal, D. T. 248 (11).  
 McGregor, E. A. —, 939 (12).  
 Mackenzie, K. K. 101 (5).  
 McKeever, H. G. 31 (12).  
 McLean, T. R. — (12).  
 Mackie, W. W. — (7).  
 Macoun, J. —, 53 (6).  
 McMurphy, J. 160, 336 (1); 161 (20).  
 Marsh, H. 7739 (5).  
 Marsh, C. D. 12330 (8).  
 Marshall, C. C. — (1); — (20).  
 Mason, H. L. 79 (12).  
 Mearns, E. A. 72, 265 (11); 3363 (12).  
 Meehan, T. — (6); — (11); — (12).

- Merriam, C. H. — (1).  
 Merrill, Rev. Dr. — (3).  
 Metcalfe, O. B. 366, 1091 (11).  
 Michener, Miss. — (7).  
 Michener, C. A. & F. T. Bioletti, — (1);  
 1344a ? (12); 423a (20).  
 Miles, L. O. —, 172 (8).  
 Miller, C. E. —, (12).  
 Minthorn, M. — (7).  
 Mosier, C. A. — (6).  
 Moxley, G. L. 586 (7a).  
 Mulford, A. I. —, 116 (8); 360, 436, 436a  
 (11).  
 Mulliken, E. 35, (12); 109 (14).  
 Munz, P. A. 9866 (1); 3186 (5); 1555  
 (7a); 4516 (11a); 2144, 3889, 6975,  
 7166, 8272, 8360, 9233, 9501, 9777,  
 9778, 10836 (12); 10271, 10327 (12a);  
 7349, 10572 (13); 11091 (16); 5654,  
 10600 (18); 6339 (19a).  
 Munz, P. A. & I. M. Johnston 5428,  
 5441 (12); 3660 (19a).  
 Murdoch, J. Jr. 4756 (11).  
 Murdoch, J. M. 2512 2573 (13).  
 Nelson, A. 7967, 1489, (5); 4101 (8);  
 9069, 1463 (11).  
 Nelson, A. & J. F. Macbride, 412, 1204,  
 2104 (8); 1386 (11).  
 Nelson, E. 651 (5); 4892 (11).  
 Nelson, E. W. 4543, 4823, 6044 (11).  
 Nelson, J. C. 1296 (5); 2646 (6); 650,  
 1294, 2693, 3155, 3843, 4356, 4368 (7);  
 584, 585, 653, 1302, 3651 (9); 2122,  
 3612, 3640 (10); 1360, 2678 (14).  
 Nevins, J. C. 939 (4); —, 254 (12); —  
 (14).  
 Newberry, J. S. — (2); — (5); — (11).  
 Newcomer, E. T. — (7).  
 Newell, G. — (12).  
 Norton, M. E. — (12).  
 Norville, Mrs. H. O. — (11).  
 Nuttall, T. — (9); — (12); — (12a).  
 Nutting, F. P. — (1).  
 Oliver, J. C. — (11a).  
 Orcutt, C. R. —, 305 (12).  
 Osterhout, G. E. —, 1534 (5); — (11).  
 Owens, C. E. — (7).  
 Palmer, E. —, 62 (5); 2532 (7); 203 (7a);  
 2532 (8); —, 61, 64, 117, 132, 310  
 (11); 24 (12); 2519 (14).  
 Palmer, E. & E. Coues, —, 221 (11).  
 Pammel, L. H. & R. E. Blackwood, 4111  
 (8).  
 Parish, S. B. —, 478, 1747, 1804, 1956,  
 2080, 2199, 3639, 3640, 4687, 4854,  
 9823 (11a); —, 2067, 2198, 3640, 6957,  
 11783 (12); 10941 (13); —, 1805, 2343,  
 3172, 3783 (3753), 10876 (18); 3786,  
 3826 (19a).  
 Parish, W. F. & S. B. 1747 (11a).  
 Parry, C. C. — (1); — (2); — (4); 23,  
 85 (1862), 429 (5); — (7); —, 24, 430  
 (11); — (12); — (16).  
 Parsons, M. E. — (12).  
 Patterson, J. R. 49 (7).  
 Patterson & Wiltz — (12).  
 Payson, E. B. 138, 192 (5).  
 Pease, T. C. — (12).  
 Pease, Mrs. T. C. — (12).  
 Pearson, G. A. 279 (11).  
 Peck, M. E. 6357, 13420, (6); 13224,  
 6846, 6848, 6861, 6863, 6864, 6869,  
 6870, 6871, 6874, 6875, 8029, 9545,  
 10351, 14314, 15205, 15205a, 15297,  
 15404, 15406, 15443 (7); 1415, 6860,  
 9331, 13308, 15128, 15408 (8); 6851,  
 6867, 6868 (8a); 6855, 6856, 6862,  
 6872, 6874, 6873 (9); 6866, 6877 (10);  
 9068, 14669 (12); 6878, 6853, 6846  
 (14).  
 Peckham — (12).  
 Peebles, R. H. & G. J. Harrison, 4192  
 (11).  
 Peebles, R. H., G. J. Harrison, & T. H.  
 Kearney, 2610, 4314 (11).  
 Peirson, F. W. 6107 (7); 6867 (8); 2056  
 (12); —, 2251 (19a); 3774 (20).  
 Pendleton, R. A. — (7); — (13); — (16).  
 Pendleton, R. L. 912 (1).  
 Phelps, K. E. — (9).  
 Philips, S. — (3).  
 Pierce, W. M. — (12); — (18).  
 Piper, C. V. — (1); 723, 4915 (6); —,  
 1644, 1645, 2396 (8); 6171 (14); —  
 (20).  
 Pope, A. S. — (6).  
 Prescott, H. S. — (14).  
 Price, W. W. — (1); — (14).  
 Pruett, H. 67 (11a).  
 Purdy, C. — (12).

- Purpus, C. A. 109 (1090 or 1091), 4056 (1); 230, 243, 6697 (6692 ?) (5); — (7); 5184 (7a).
- Randall, A. D. —, 13, 156, 196, 303, 430 (12).
- Rattan, V. — (1); — (2); —, 21 (4); — (7); — (12); — (14); — (20).
- Read, A. D. 17 (5).
- Redfield, J. N. 41 (7); 40 (16).
- Reed, F. M. 1351 (12); — (18); 2755 (19a).
- Reinoehl, D. — (14).
- Reynolds, L. 8988 (9).
- Rich, W. H. — (12).
- Rixford, G. P. — (4).
- Robinson & Crocker — (12).
- Rose, J. P. 1713 (8).
- Ross — (12).
- Rothrock, J. T. 14 (12).
- Rusby, H. H. 47 (11).
- Rutter, C. 123 (1); — (12).
- Rydberg, P. A. 6169 (8).
- Rydberg, P. A. & E. C. Carlton, 7486, 7610 (5).
- Rydberg, P. A. & A. O. Garrett, 9523 (5); 9211, 9680 (11).
- Samuels, E. 29 (1); 31 (12).
- Sandberg, J. H. — (8).
- Sandberg, J. H., D. T. MacDougal & A. A. Heller — (8).
- Sandberg, J. H. & J. B. Leiberg, 536 (8).
- Sanford, H. — (12).
- Sanford, J. A. — 349 (1); 419 (7); — (8); 426 (16).
- Schmitt, W. F. — (12).
- Schoenfeldt, L. 3455, 3575 (12).
- Schulz, E. D. 289 (5).
- Setchell, W. A. — (12).
- Setchell, W. A. & C. C. Dobie, — (14).
- St. John, O. — (5).
- St. John, Mrs. H. — (11).
- Shaw, W. R. 533 (12).
- Shaw & Illingsworth, 51 (13); 232 (18).
- Shear, C. L. 3638 (5); 5622 (9); 3551, 5136 (11).
- Shear, C. L. & E. A. Bessey, 3968, 5305 (5).
- Sheldon, C. S. 211 (5); 367 (11).
- Sheldon, E. P. 8423 (8); 10872 (9).
- Sheldon, J. W. — (12).
- Sherwood, W. 831 (14).
- Smiley, F. J. 188, 325, 672 (7); 884 (16).
- Smith, A. H. — (4).
- Smith, B. H. — (4); — (5); — (11); — (12); — (12a); — (14).
- Smith, C. P. 1876 (5); 1742, 1901 (8).
- Smith, L. E. —, 333 (7); 243 (14).
- Smith, L. S. 1842 (14).
- Smith, R. J. 11 (12).
- Snow, F. H. — (5).
- Sonne, C. F. — (3); 342 (7); 1428 (12); —, 42, 63 (16).
- Spalding, Rev. Mr. — (8).
- Spencer, H. —, 2 (10).
- Spencer, M. F. —, 146, 2016 (12).
- Spiegelberg, C. H. —, 644 (6).
- Standley, P. C. 4077, 6588, 14062, (5); 4966, 6587, 8242, 13872 (11).
- Standley, P. C. & H. C. Bollman, 10969 (5); 11040 (11).
- Stanford, E. E. 971 (2); 219, 220, 1005 (4); 416, 1083 (14).
- Steinbeck, W. P. — (2); — (3); — (16).
- Stevenson, E. 119 (8).
- Steward, A. N. 173 (9).
- Stinchfield, R. 268 (12).
- Stokes, S. G. — (8); — (12).
- Street, L. — (12).
- Sturgis, W. C. — (5); — (11).
- Suksdorf, W. N. —, 2446, 2447, 2448, 2449 (8); 1877, 2216 (9); 132 (12a).
- Summers, R. W. —, 102 (12).
- Sutcliffe, E. C. (1); — (7); — (16).
- Sutcliffe, Mrs. E. C. — (3); — (7); — (19); — (20).
- Thompson, C. H. — (12).
- Thompson, J. W. 532 (9); 2035, 4339, 4446, 4507, 4534 (14).
- Thurber, G. 334, 340, 1664 (11); 334 (11a); 559 (12).
- Tidestrom, I. 10391, 10441 (7); — (12); 10562, 10569, 10571 (17).
- Torrey, J. 54 (16).
- Tourney, J. W. 80 (11).
- Townsend, C. H. T. & C. M. Barber, 55 (11).
- Tracy, J. P. 1576, 4468, 5539 (1); 5645 (3); 1648 (4); 2288, 2351, 2578, 4331, 5253, 5344, 5394 (7); 1363, 2193, 2194, 3595, 3596, 3597, 3669 (12); 2813,

- 3349, 3598, 5713, 7659 (14); 3141, 3010, 3716, 4964 (20).  
 Tracy J. P. & E. B. Babcock, 3595, 3596, 3597 (12); 3598 (14).  
 Trelease, W. — (11).  
 Tweedy, F. 134, 4569 (5); 554, 4570 (11).  
 Van Dyke, Mrs. E. C. — (7); — (11a); — (12); — (18).  
 Vasey, G. R. —, 89 (5); — (7); 223 (8); — (11); — (12); — (20).  
 Vesey, L. J. X. de, 15 in part (11a).  
 Walker, E. P. 323 (5); 515 (11).  
 Walker, H. A. 312 (1); 83 (12); 1388 (16).  
 Wallace — (12).  
 Walls, E. P. & C. E. Owens — (9).  
 Watson, S. 194 (5).  
 Weston, E. R. 167 (7a).  
 Whited, K. 252, 3099 (7); 486, 2559 (8).  
 Wiggins, I. L. 1961, 2075 (12).  
 Wight, W. F. 102 (12).  
 Wilcox, T. E. — (8).  
 Wilder, E. M. — (12).  
 Wilkes Exp. 206 (6).  
 Williams, T. A. — (8).  
 Williamson, C. S. — (7); — (12).  
 Williamson, W. J. 12 (4).  
 Wislizenus, F. 841 (5); 915 (12).  
 Wolf, J. & J. T. Rothrock, 14 (11).  
 Woodhouse, S. W. — (11).  
 Woods, C. N. 335, 2621 (8).  
 Woodson, R. E. Jr., 1814 (5).  
 Wooton, E. O. — (5); —, 192, 2671 (11).  
 Wright, C. 39, 880 (11).  
 Wright, W. F. 102 (12).  
 Wynd, F. L. 1640 (7).  
 Yates, L. D. — (10).  
 Yates, L. G. — (12a).  
 Zuck, M. — (11).

### INDEX TO SPECIES

New subgenera, sections, species, varieties and combinations are printed in **bold face type**; synonyms in *italics*; and previously published names in ordinary type.

	Page		Page
Adansonia	128	Malveae	124
Althaea	118, 125	<i>Nuttallia malvaeflora</i>	188
<b>Annuae</b>	127, 129, 134, 138	<b>Perennes</b>	127, 129, 130, 134, 151, 212
Bombacaceae	128	Sida	117, 125, 197
Callirhoe	125	<i>californica</i>	199
<i>spicata</i>	159, 165	<i>delphinifolia</i>	143, 145, 188, 193, 197
Eumalveae	125	<i>diploscypha</i>	139
Eusidalcea	127, 129, 130, 134, 138, 212	<i>heterophylla</i>	173
Hesperalcea	120, 122, 123, 124, 127, 128, 129, 214, 217	<i>malvaeflora</i>	175, 176, 177, 179, 188, 196, 197, 198
† <i>Hesperalcea</i>	118, 214, 217	<i>oregana</i>	168, 173, 174
<i>Hesperalcea</i>	137, 215	Sidalcea	117, 118, 119, 120, 124, 125, 127, 136, 145, 197, 217
<i>malachroides</i>	128, 215	<i>asplenifolia</i>	175, 177
Lavatera	143	<i>asprella</i>	121, 130, 132, 179, 201, 205, 206, 209
Malva	118, 125, 143	<i>atacosa</i>	218
<i>malachroides</i>	215, 217	<i>atropurpurea</i>	218
Malvaceae	121, 124	<i>californica</i>	199
<b>Malvastralcea</b>		<i>calycosa</i>	124, 145, 147, 151
120, 122, 123, 127, 128, 130, 211, 212		<i>campestris</i>	132, 133, 169, 174, 175, 177, 178, 179, 197, 218
Malvastrum	125, 128, 212		
<i>confertum</i>	213		
<i>spicatum</i>	128		

	Page		Page
<i>candida</i> .....		<i>multifida</i> .....	130, 209
121, 123, 129, 133, 134, 153, 155		" <i>Murrayana</i> ".....	159
<i>candida</i> var. <i>tinctoria</i> .....	153, 157	<i>Nelsoniana</i> .....	159, 161, 165
<i>confinis</i> .....	122, 132, 179, 181, 185	<i>neo-mexicana</i> .....	
<i>Covillei</i> .....	187	121, 122, 129, 132, 156, 157, 179,	
<i>crenulata</i> .....	179, 185	184, 185, 187, 197, 198, 201, 209	
<i>Cusickii</i> .....	174	<i>neo-mexicana</i> var. <i>Covillei</i> .....	132, 187
<i>delphinifolia</i> .....	143, 145, 188, 197, 198	<i>neo-mexicana</i> var. <i>Diehlii</i> .....	179, 184, 185
<i>delphinifolia</i> var. <i>humilis</i> .....	189, 198	<i>neo-mexicana</i> var. <i>parviflora</i> .....	
<i>diploscypha</i> .....		132, 186, 188	
118, 121, 123, 125, 138, 143		<i>nervata</i> .....	169, 174
<i>diploscypha</i> var. <i>minor</i> .....	139, 142	<i>nitrophila</i> .....	122, 186
<i>elegans</i> .....	202, 203, 205	<i>nodosa</i> .....	218
<i>eximia</i> .....	133, 159, 166	<i>oregana</i> .....	132, 133, 158,
<i>favosa</i> .....	200, 201	168, 174, 175, 177, 185, 197, 198, 209	
<i>glaucescens</i> .....		<i>oregana</i> var. <i>Cusickii</i> .....	133, 174
130, 132, 158, 187, 205, 207, 209, 210		<i>Parishii</i> .....	213
<i>Hartwegi</i> .....	134, 143, 148, 151	<i>parviflora</i> .....	122, 185, 186, 187
<i>Hartwegi</i> var. <i>tenella</i> .....	148, 151	<i>parviflora</i> var. <i>Thurberi</i> .....	132, 179, 185
<i>Hendersonii</i> .....		<i>pedata</i> .....	130, 151, 210
121, 122, 133, 157, 158, 174, 209		<i>peruviana</i> .....	218
<i>Hickmani</i> .....	212	<i>ranunculacea</i> .....	166, 167
<i>Hickmani</i> .....	129, 213	<i>reptans</i> .....	132, 200, 201
<i>Hickmani</i> var. <i>Parishii</i> .....	129, 130, 213	<i>rhizomata</i> .....	122, 145, 146, 147, 148
<i>hirsuta</i> .....		<b><i>robusta</i></b> .....	130, 205, 206
123, 124, 125, 143, 145, 151, 197		<i>rostrata</i> .....	189, 190, 198
<i>humilis</i> .....	188, 196, 197, 198	<i>scabra</i> .....	189, 198
<i>hydrophila</i> .....	159, 166	<i>secundiflora</i> .....	139, 143
<i>interrupta</i> .....	166, 167	<i>spicata</i> .....	132, 133, 159, 165, 166
<i>malachroides</i> .....		<i>spicata</i> var. <i>pedata</i> .....	210
118, 123, 125, 128, 215, 217		<i>spicata</i> var. <i>ranunculacea</i> .....	166
<i>malvaeflora</i> .....	121, 132, 145,	<i>spicata</i> var. <i>reptans</i> .....	200
177, 184, 185, 187, 188, 197, 198, 201		<i>sulcata</i> .....	145, 147, 148
<i>malvaeflora</i> .....		<i>sylvestris</i> .....	175, 177
156, 157, 168, 179, 184, 187, 197, 198		<i>tenella</i> .....	148, 151
<i>malvaeflora</i> var. <i>asprella</i> .....	202	<i>triloba</i> .....	218
<i>malvaeflora</i> var. <i>atropurpurea</i> .....	218	<i>valida</i> .....	159, 165, 166
<i>malvaeflora</i> var. <i>californica</i> .....	199	<i>virgata</i> .....	132, 174, 178
<i>malvaeflora</i> var. <i>Listeri</i> .....	218	<i>vitifolia</i> .....	215, 217
<i>malvaeflora</i> var. <i>Oregana</i> .....	157, 168, 174	<i>Sidalcea</i> .....	145
<i>mariana</i> .....	218	<i>Sphaeralcea</i> .....	125, 213
<i>mexicana</i> .....	218	<i>pedatifida</i> .....	218
<i>montana</i> .....	207, 209		



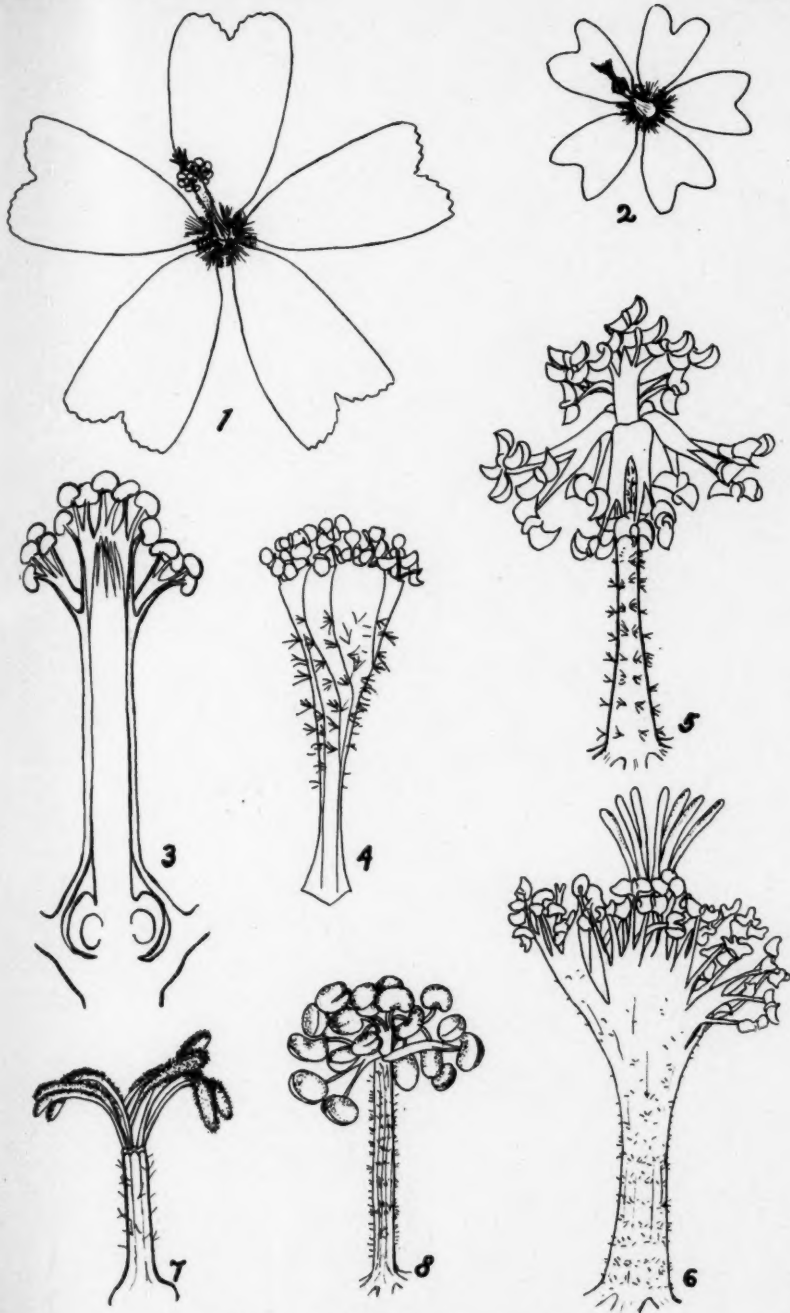


## EXPLANATION OF PLATE

## PLATE 5

- Fig. 1. Perfect flower of *S. malvaeflora* (DC.) Gray.  $\times \frac{3}{4}$ .  
Fig. 2. Pistillate flower of *S. malvaeflora* (DC.) Gray.  $\times \frac{3}{4}$ .  
Fig. 3. Longitudinal section of the stamineal column of *S. candida* Gray, showing the outer and inner series of phalanges.  $\times 3$ .  
Fig. 4. Staminal column of *S. diploscypha* (Torr. & Gray) Gray, typical of the section *Annuae*.  $\times 3$ .  
Fig. 5. Staminal column of *S. candida* Gray, typical of the section *Perennes*.  $\times 3$ .  
Fig. 6. Staminal column of *S. Hickmani* var. *Parishii* Rob., typical of the subgenus *Malvastralea*.  $\times 3$ .  
Fig. 7. Staminal column of the pistillate flower of *S. malachroides* (H. & A.) Gray of the subgenus *Hesperalcea*.  $\times 3$ .  
Fig. 8. Staminal column of the perfect flower of *S. malachroides* (H. & A.) Gray of the subgenus *Hesperalcea*.  $\times 3$ .

Del. C. K. Allen



ROUSH—MONOGRAPH OF SIDALCEA







## EXPLANATION OF PLATE

## PLATE 6

Photomicrographs of the dorsal and lateral surfaces of carpels of *Sidalcea*, illustrating the various types of markings in the subgenera and section. Magnification approximately 10 diameters.

Subgenus *Eusidalcea*—Section *Annuae*.

Fig. 1. *S. hirsuta* Gray.

Fig. 2. *S. Hartwegi* Gray.

Fig. 3. *S. calycosa* M. E. Jones (entire fruit, viewed from above).

Fig. 4. *S. calycosa* M. E. Jones.

Subgenus *Eusidalcea*—Section *Perennes*.

Fig. 5. *S. spicata* (Regel) Greene.

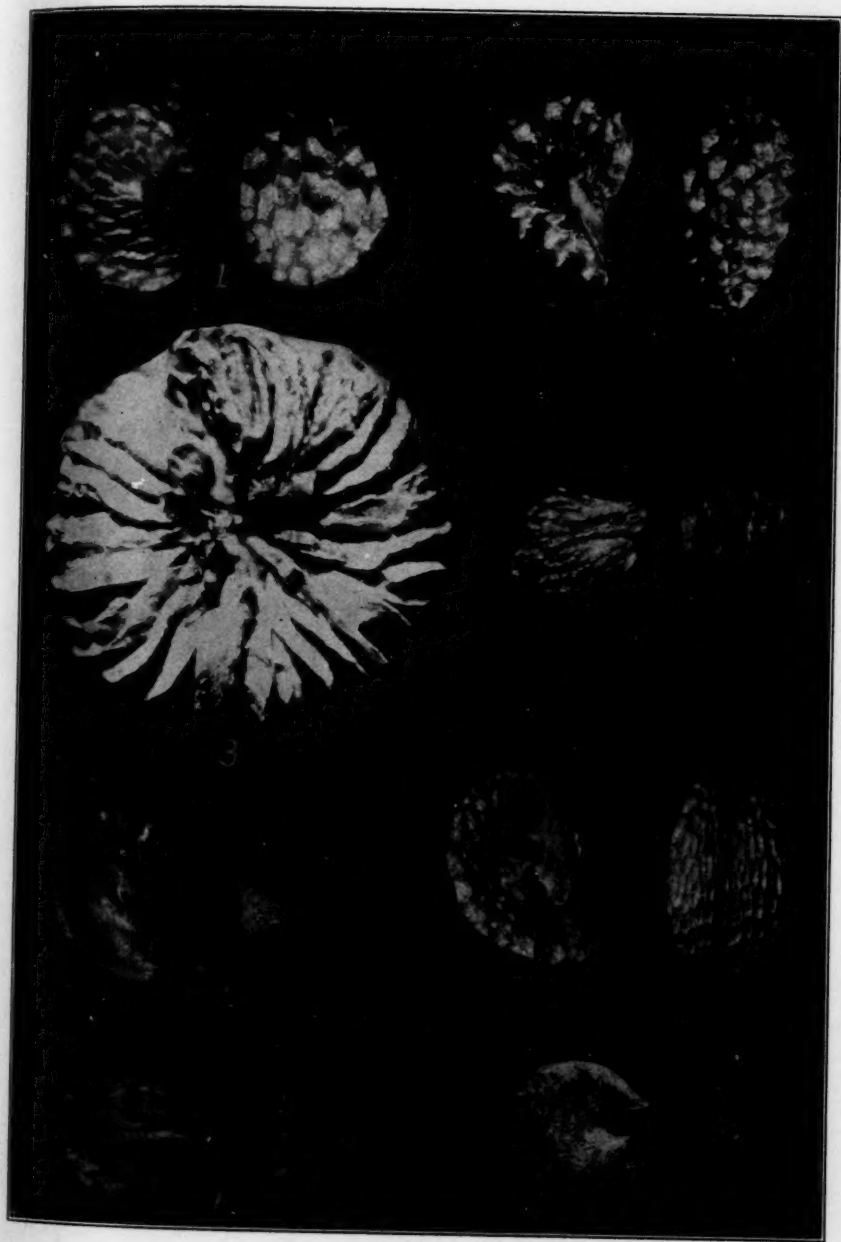
Fig. 6. *S. oregana* (Nutt.) Gray.

Subgenus *Malvastralcea*.

Fig. 7. *S. Hickmani* var. *Parishii* Rob.

Subgenus *Hesperalcea*.

Fig. 8. *S. malachroides* (H. & A.) Gray.



ROUSH—MONOGRAPH OF SIDALCEA



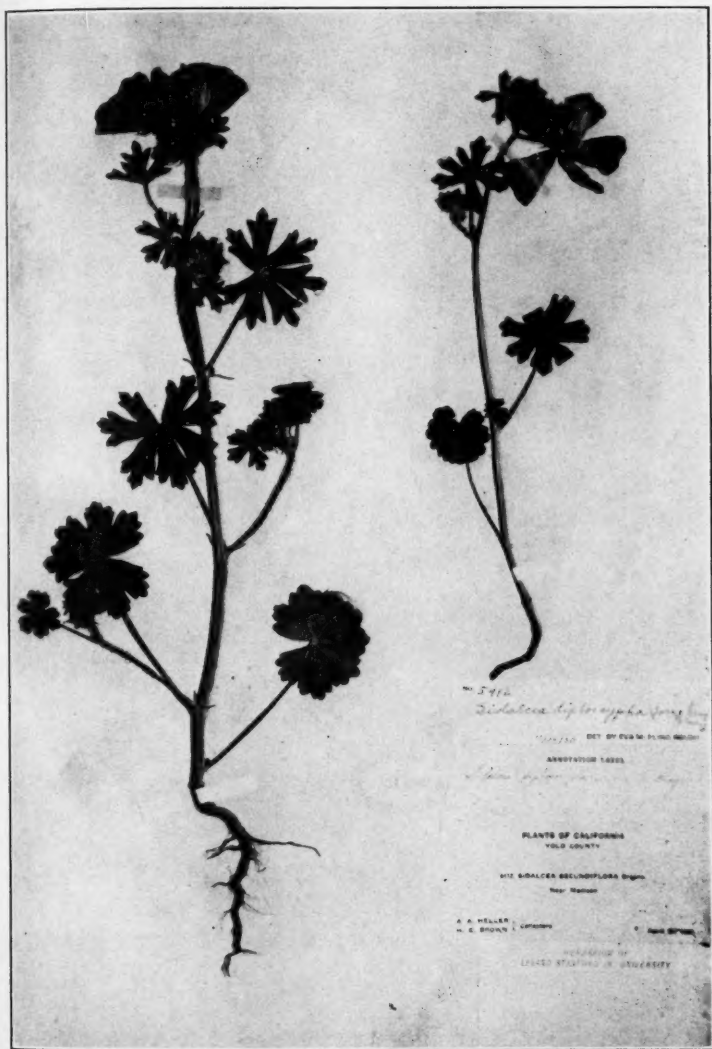


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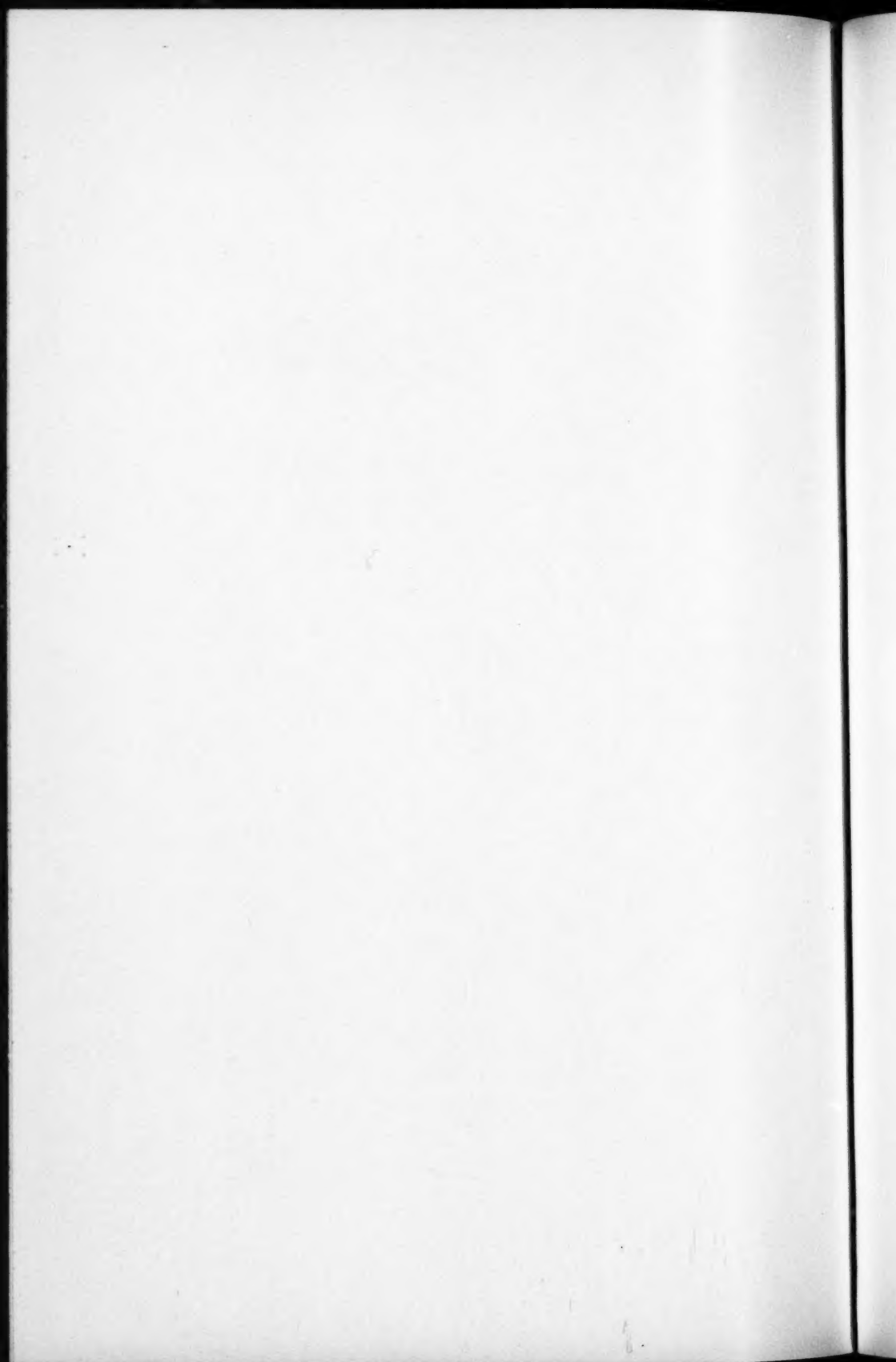
## PLATE 7

*Sidalcea diploscypha* (Torr. & Gray) Gray, from Heller & Brown No. 5412, in the Herbarium of Leland Stanford, Jr. University, typical of the subgenus *Eusidalcea* section *Annuae*.





ROUSH—MONOGRAPH OF SIDALCEA



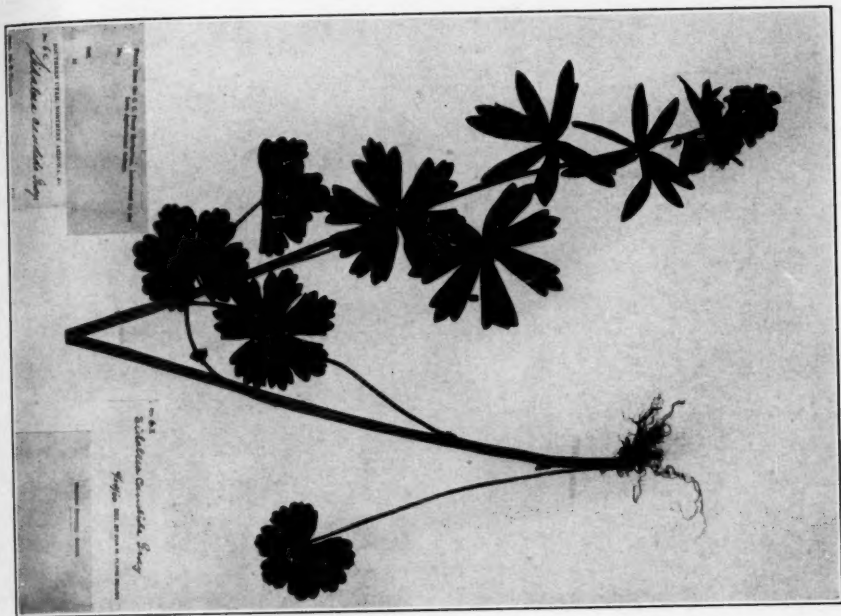


## EXPLANATION OF PLATE

## PLATE 8

Fig. 1. *Sidalcea candida* Gray, from Palmer No. 62 in the Missouri Botanical Garden Herbarium, showing usual variation of leaves in the subgenus *Eusidalcea* section *Perennes*.

Fig. 2. *Sidalcea campestris* Greene, from the cotype, T. J. Howell No. 614 in the Gray Herbarium of Harvard University.







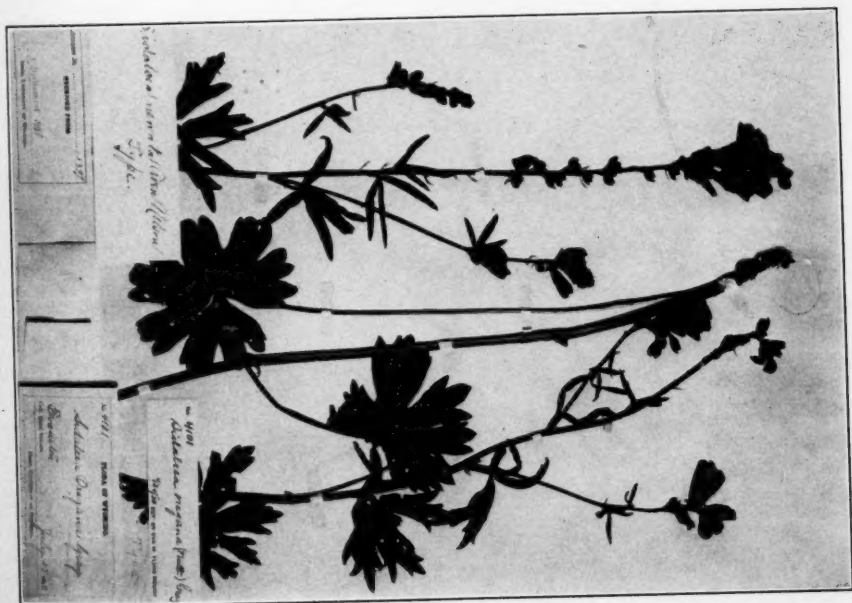
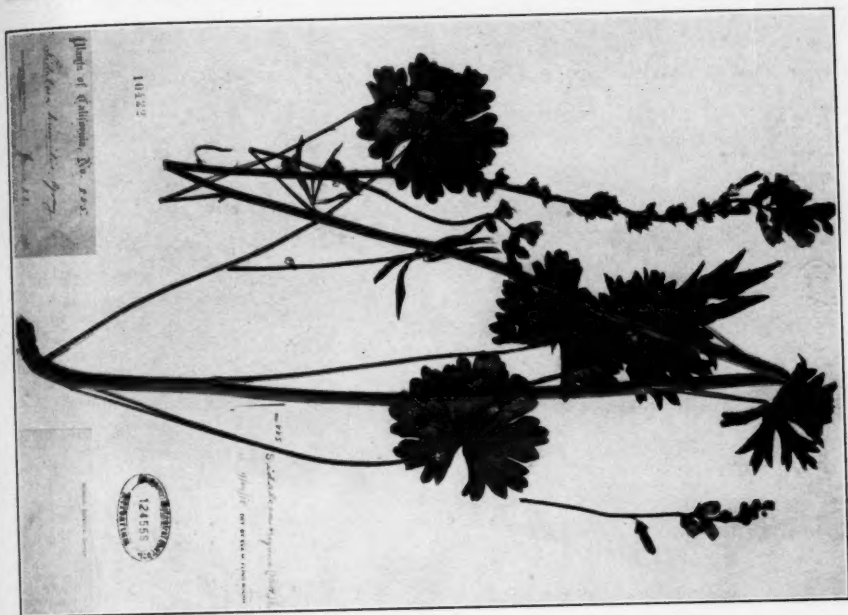


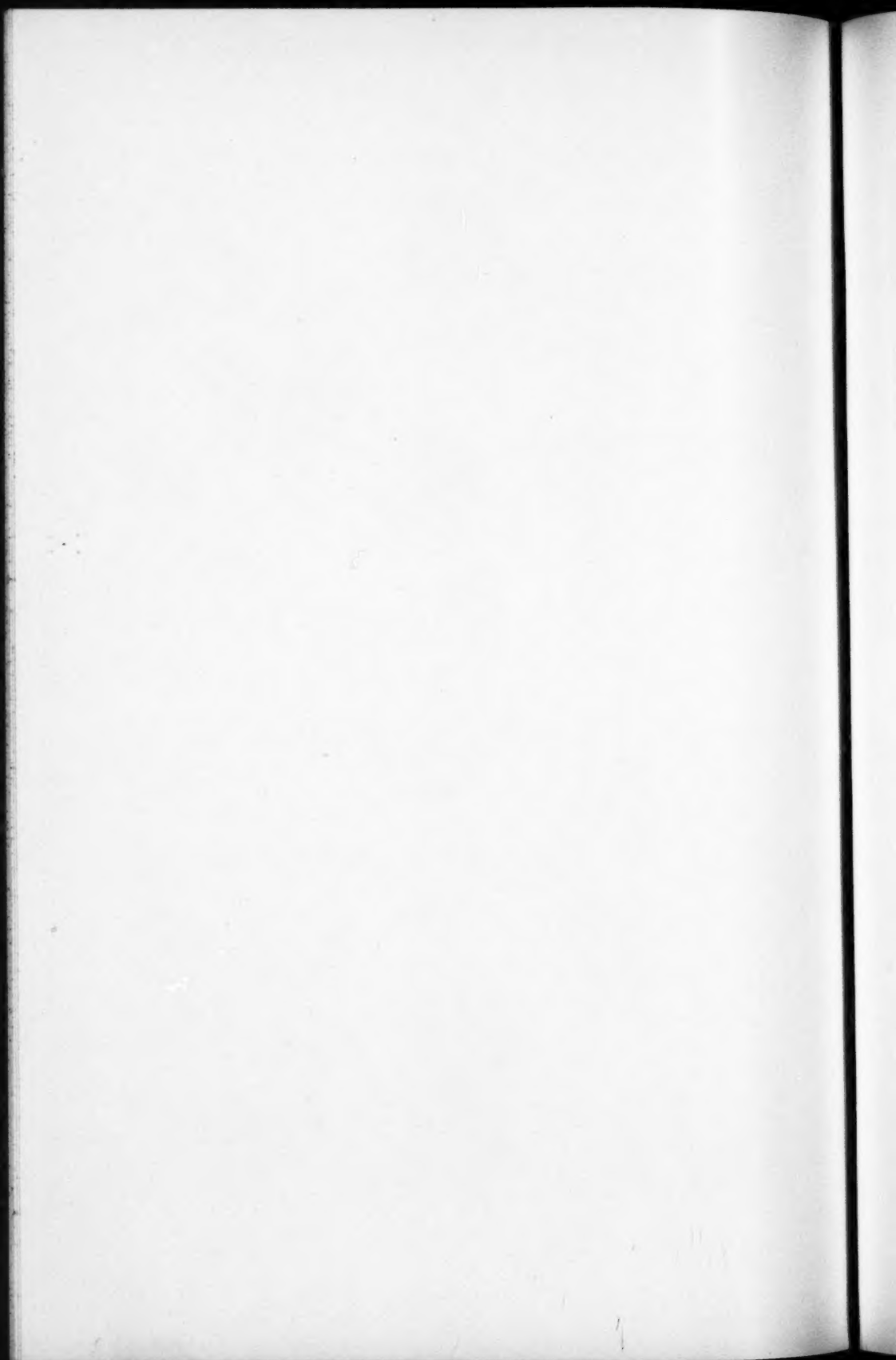
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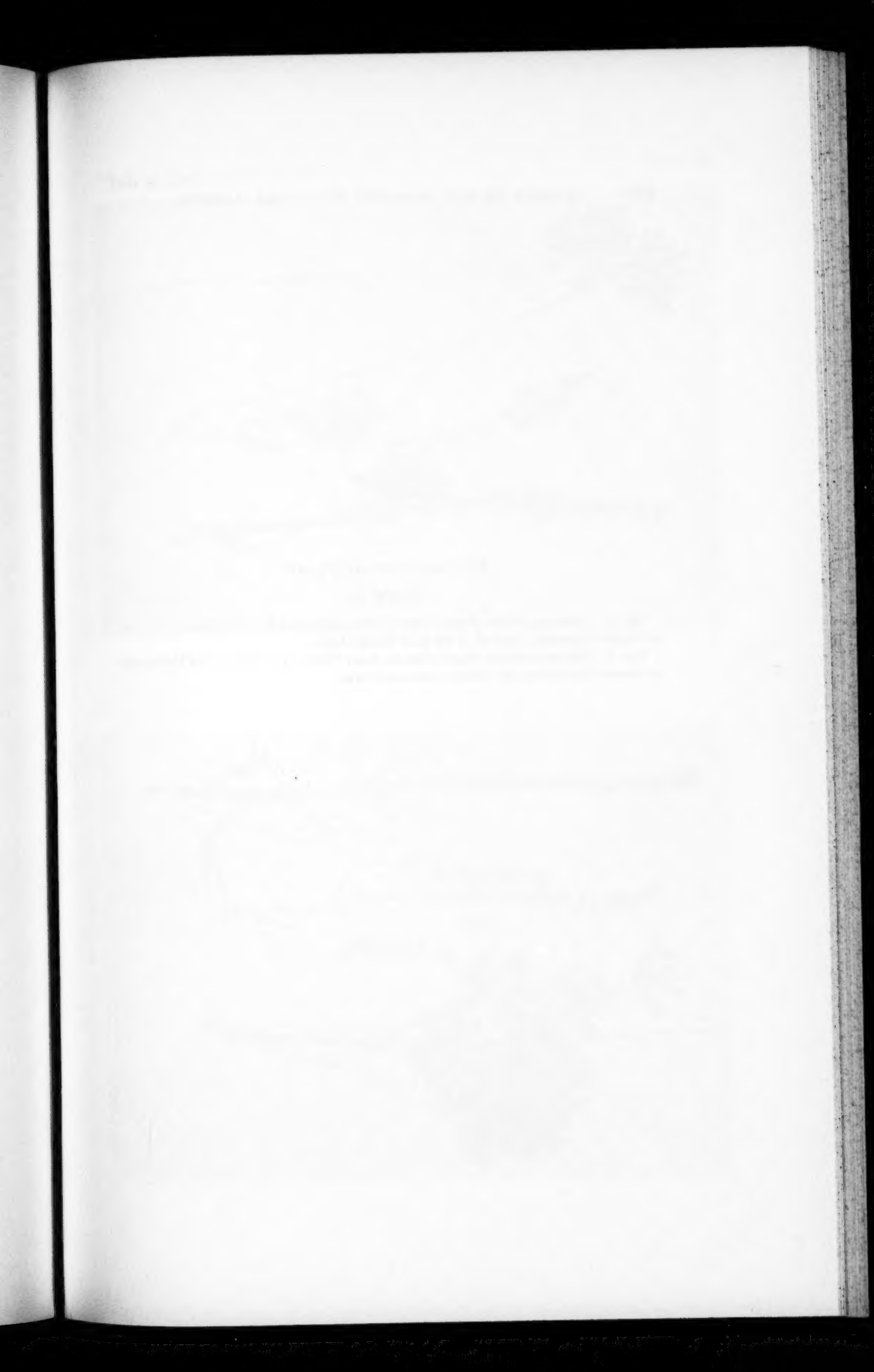
## PLATE 9

Fig. 1. *Sidalcea oregana* (Nutt.) Gray, from *Greene No. 885* in the Missouri Botanical Garden Herbarium, typical of the more harshly puberulent form.

Fig. 2. *Sidalcea oregana* (Nutt.) Gray, from type specimen of *S. nervata* A. Nelson, A. Nelson No. 4101 in the Rocky Mountain Herbarium, the more eastern and almost glabrous form.







## EXPLANATION OF PLATE

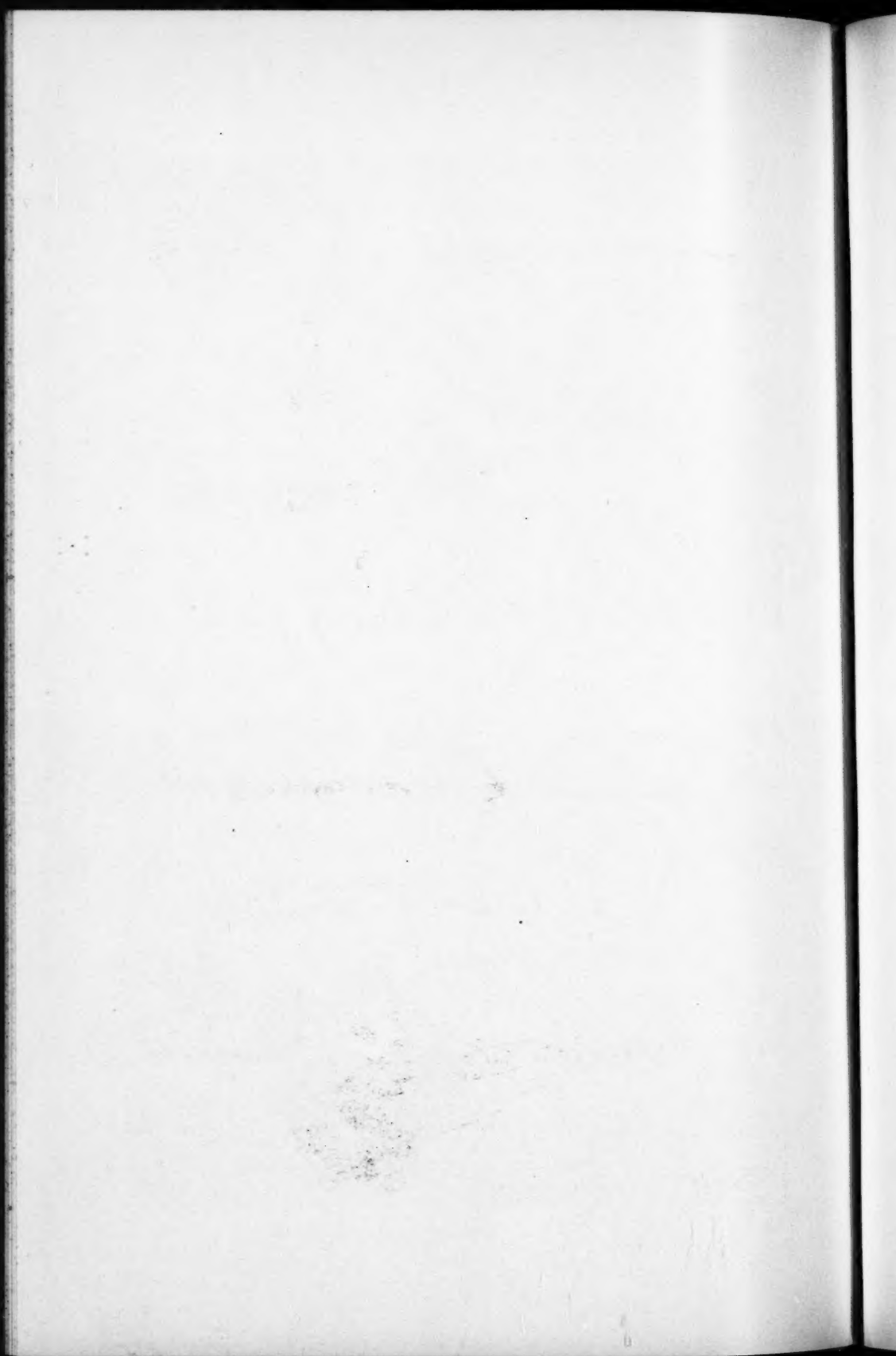
## PLATE 10

Fig. 1. *Sidalcea spicata* (Regel) Greene, from *Henderson No. 151* in the Herbarium of Oregon University, typical of the more hirsute form.

Fig. 2. *Sidalcea spicata* (Regel) Greene, from *Cusick No. 2053* in the Herbarium of Oregon University, the stellate-pubescent form.







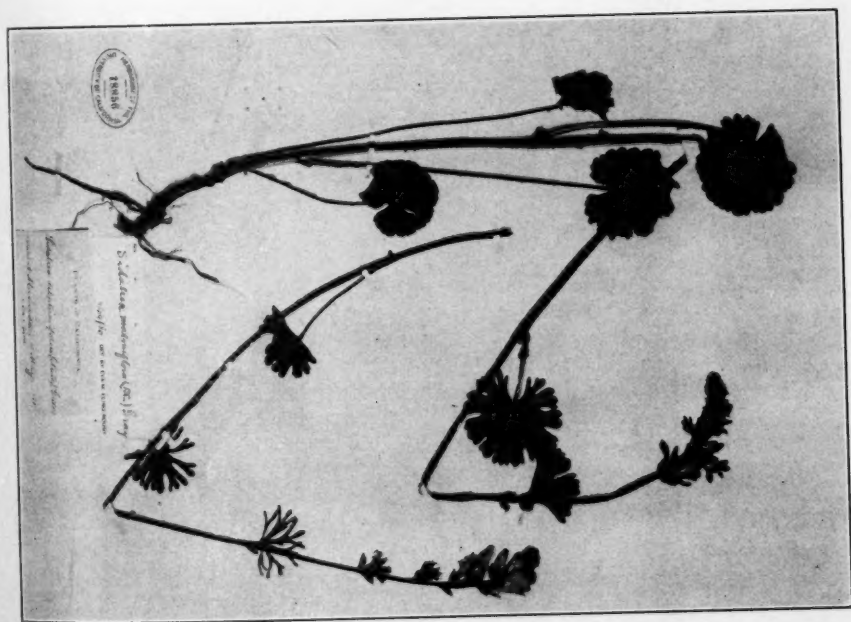
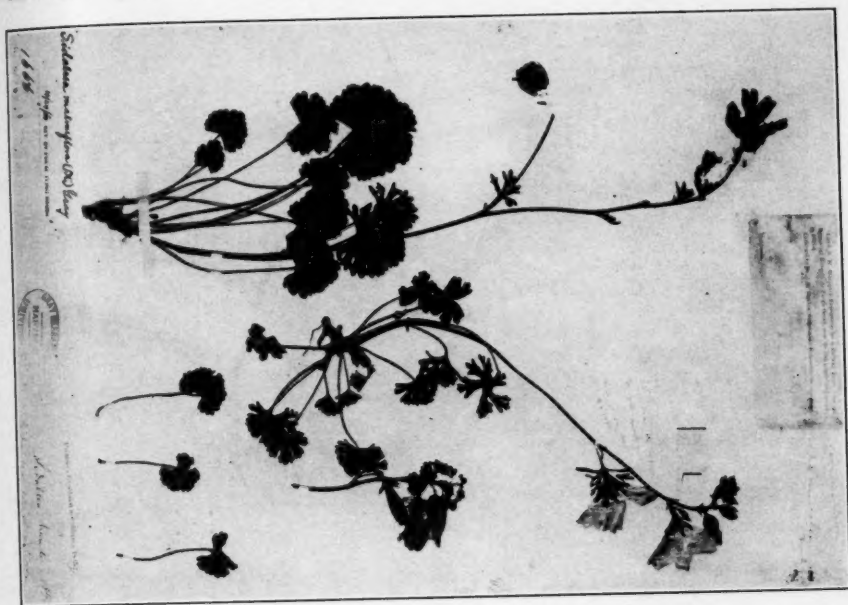


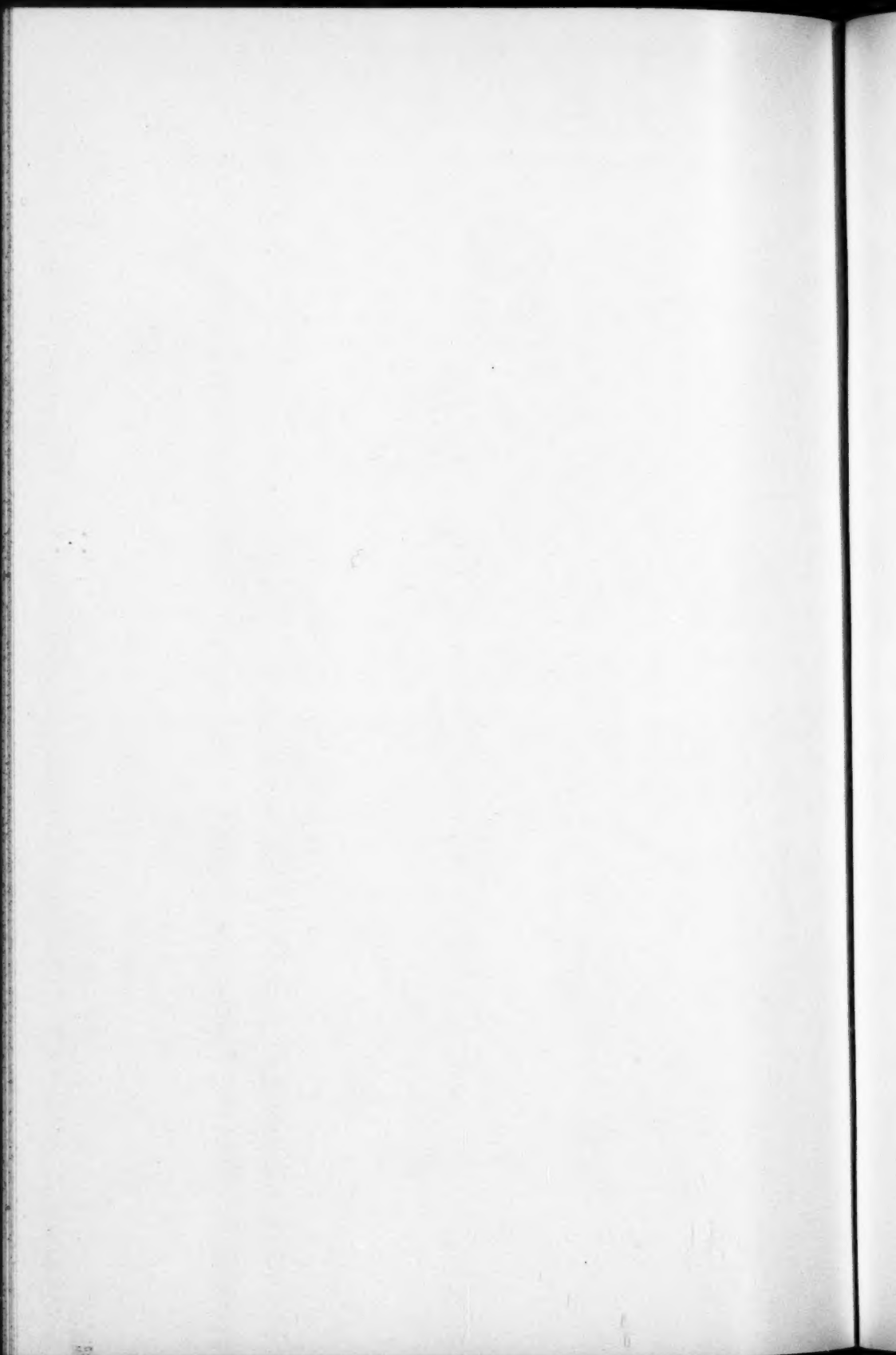
## EXPLANATION OF PLATE

## PLATE 11

Fig. 1. *Sidalcea malvaeflora* (DC.) Gray, from authentic material, *Hartweg* No. 1666, *Fremont*, and *Bigelow*, in the Gray Herbarium of Harvard University, typical of the low decumbent form.

Fig. 2. *Sidalcea malvaeflora* (DC.) Gray, from *Greene* in the Herbarium of the University of California No. 18856, typical of the more erect, robust form.









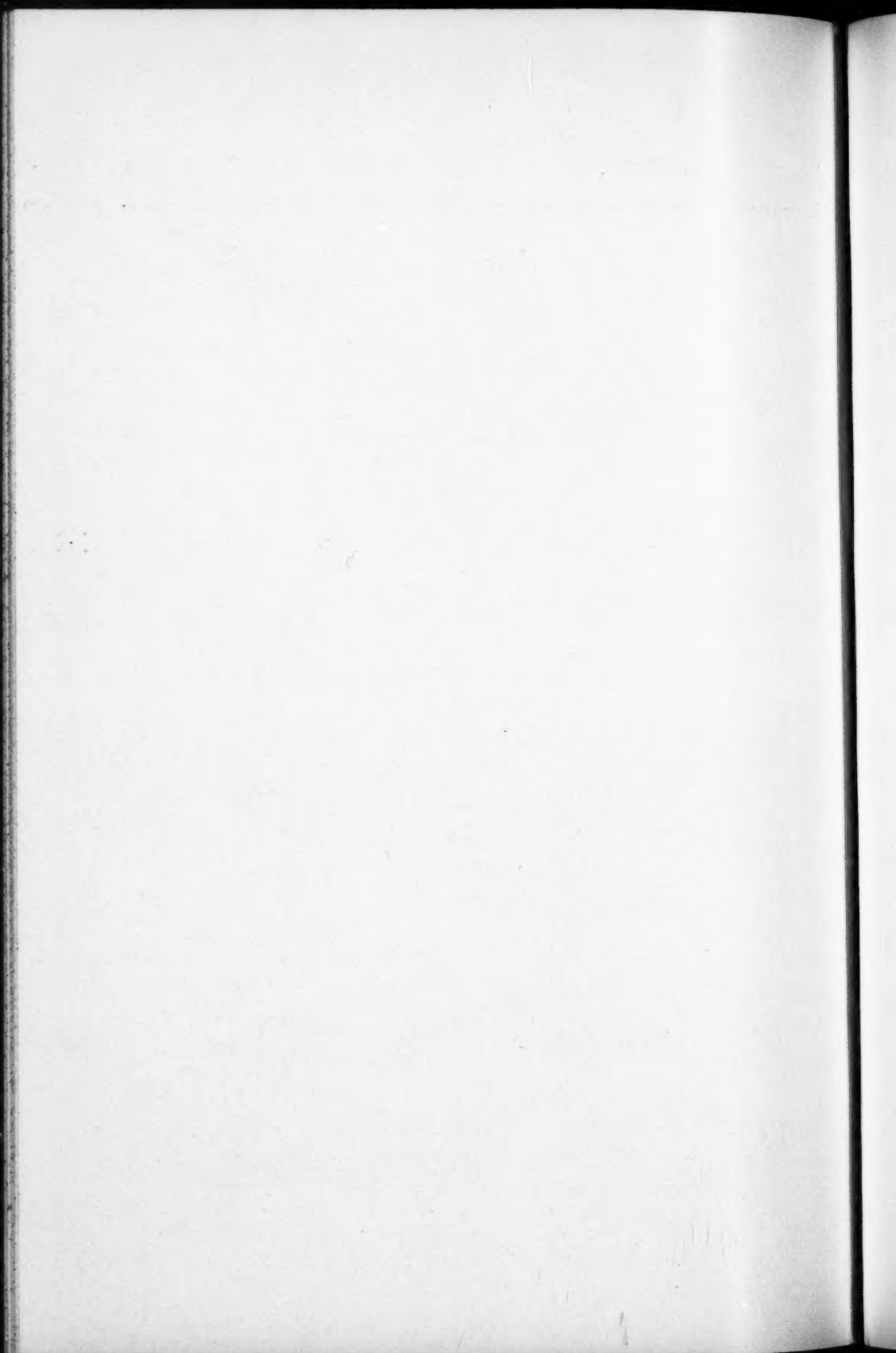
## EXPLANATION OF PLATE

## PLATE 12

Fig. 1. *Sidalcea multifida* Greene, from authentic material, A. A. Heller No. 9716 in the United States National Herbarium, showing the caespitose habit of the section *Perennes*.

Fig. 2. *Sidalcea pedata* Gray, from type specimen, S. B. Parish No. 1805 in the Gray Herbarium of Harvard University, showing the subscapiform habit.





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CONTENTS

Original Articles	1
Editorial	1
Book Reviews	1
Correspondence	1
Obituary	1
News and Notes	1
Announcements	1
Advertisements	1

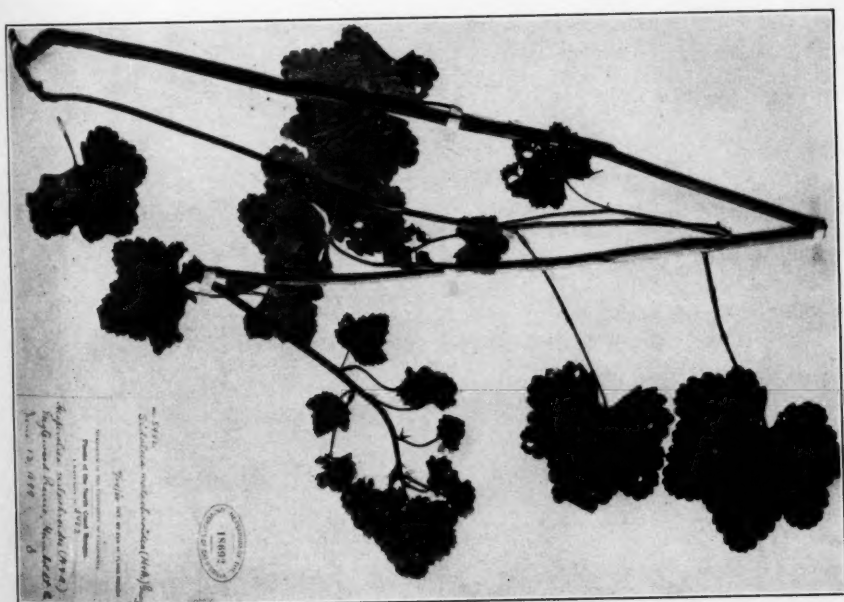
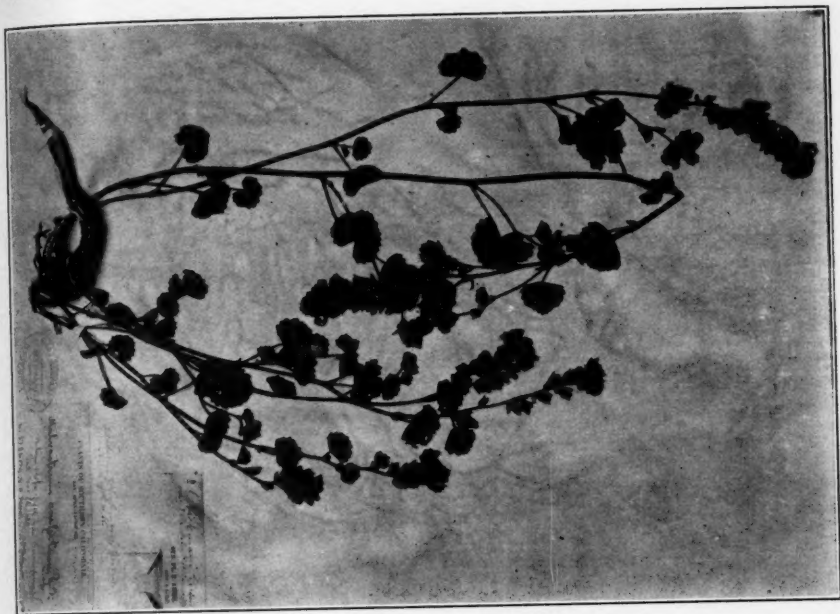
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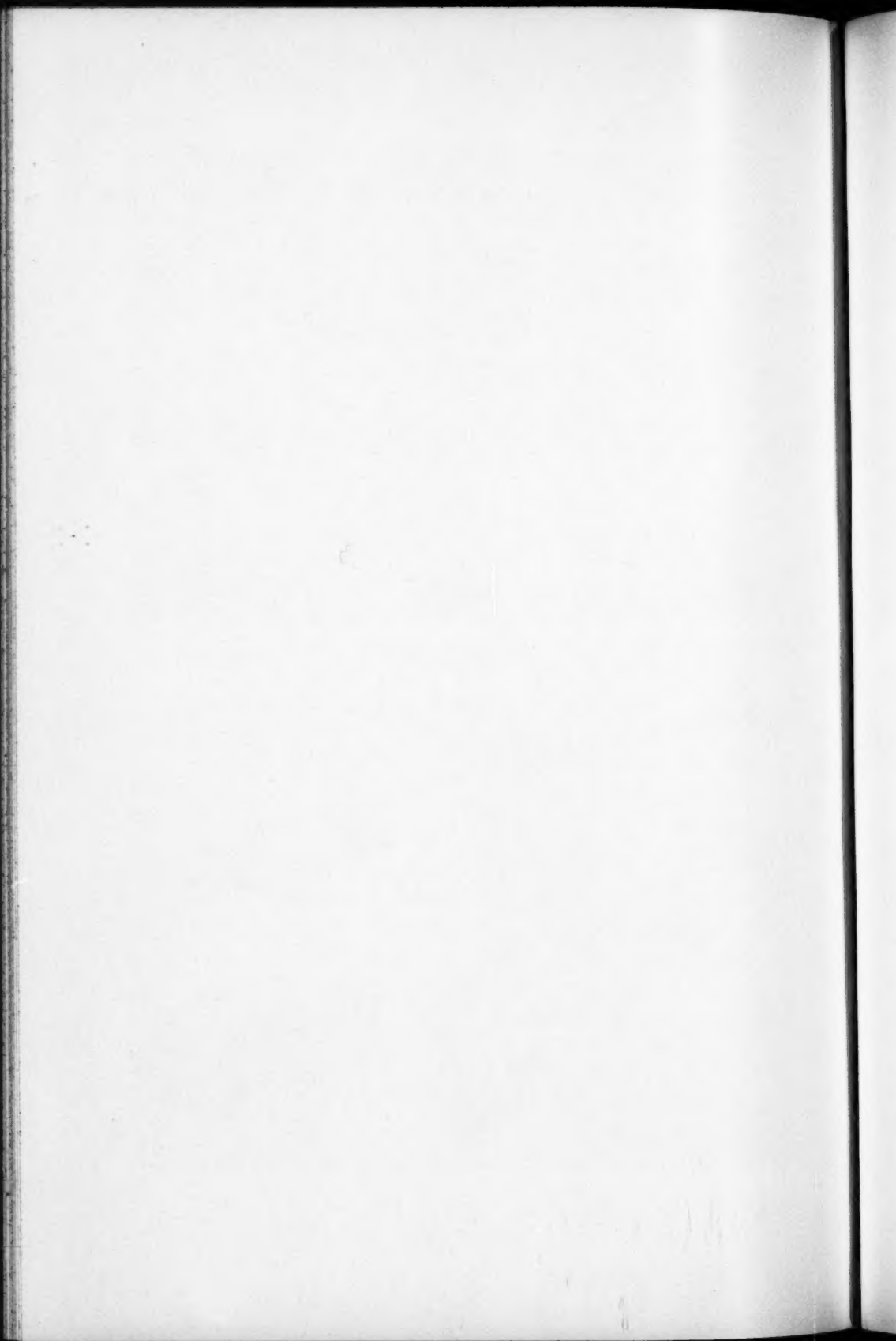
## PLATE 13

Fig. 1. *Sidalcea Hickmani* var. *Parishii* Rob., from the type specimen, S. B. Parish No. 3786 in the Gray Herbarium of Harvard University, illustrating the subgenus *Malvastralcea*.

Fig. 2. *Sidalcea malachroides* (H. & A.) Gray, from Davy No. 5482 in the Herbarium of the University of California, illustrating the subgenus *Hesperalcea*.







## A REVISION OF THE GENUS FRASERA<sup>1</sup>

HAMILTON H. CARD

*Formerly Rufus J. Lackland Research Fellow in the Henry Shaw School of Botany of Washington University*

### INTRODUCTION

The present study was undertaken to determine the status of the genus *Frasera*. In recent years it has received various treatments in the numerous local manuals and floras; certain authors have considered it a portion of the more polymorphic and widespread genus *Swertia*, others have regarded it as a distinct generic unit, whereas still others have segregated it into several smaller genera.

Sincere appreciation is due the curators of the herbaria of the University of California, Field Museum of Natural History, Gray Herbarium of Harvard University, and the Los Angeles Museum, for the loan of material necessary in this study. For the use of the excellent library and herbarium of the Missouri Botanical Garden, especial thanks are due the Director, Dr. George T. Moore. The writer desires to express his appreciation to Dr. J. M. Greenman, Curator of the Herbarium of that institution, and to Dr. Mildred E. Mathias, Research Assistant, who have so generously given their advice from time to time.

### HISTORY OF THE GENUS

Walter<sup>2</sup> described the genus *Frasera* in 1788, naming it in honor of John Fraser, a noted plant collector of the eighteenth century. A single species, *Frasera caroliniensis*, was assigned to the new genus. Fifteen years later Michaux<sup>3</sup> recognized the genus, renaming the species *F. Walleri*. Pursh<sup>4</sup> in 1814 recognized

<sup>1</sup> An investigation carried out at the Missouri Botanical Garden in the Graduate Laboratory of the Henry Shaw School of Botany of Washington University, and submitted as a thesis in partial fulfillment of the requirements for the degree of doctor of philosophy in the Henry Shaw School of Botany of Washington University.

<sup>2</sup> Walt. Fl. Carol. 87. 1788.

<sup>3</sup> Michx. Fl. Bor. Am. 1: 96. 1803.

<sup>4</sup> Pursh, Fl. Am. Sept. 1: 101. 1814.

Issued June 30, 1931.

*F. Walteri*, indicating its occurrence "In swamps of Lower Carolina and on the borders of lakes in Pennsylvania and New York."

In 1828 Rafinesque<sup>5</sup> included the genus in his 'Medical Flora,' listing but a single species, *F. verticillata*, which he admitted to be identical with *F. caroliniensis*. At the same time Rafinesque suggested the name *Mesadenia* as being more appropriate than *Frasera*. Four varieties of *F. verticillata* were also proposed in the 'Medical Flora.'

In 1839 two closely related species, *F. nitida* and *F. albicaulis*, were added to the genus. The one, *F. nitida*, was described by Benth<sup>6</sup> from material collected by Hartweg "in montibus Sacramento," California, and the other, *F. albicaulis*, by Grisebach,<sup>7</sup> based on specimens collected by Douglas in the vicinity of Spokane, Washington, and Kettle Falls, British Columbia.

Grisebach<sup>8</sup> revised the Gentianaceae for Hooker's 'Flora Boreali-Americana' in 1840, publishing another of Douglas's manuscript names as *F. speciosa*. In 1844, in de Candolle's 'Prodromus' Grisebach<sup>9</sup> recognized the genus *Frasera* and included all the species previously known.

In 1851 Hooker<sup>10</sup> published *F. thyrsiflora*. During the later years of the same decade Dr. John Torrey added two species to the genus, namely, *F. paniculata*<sup>11</sup> and *F. Parryi*.<sup>12</sup> Kellogg<sup>13</sup> in 1862 proposed the new genus *Tesseranthium*, designating the type species as *T. radiatum*. It has since been shown that *T. radiatum* Kellogg is conspecific with *Frasera speciosa* Douglas.

Since 1871 approximately fifteen new species and varieties have been described in the genus but no recent comprehensive survey of the group has been made. Treatments of the genus have appeared in the various local manuals and floras; certain workers<sup>14</sup> have segregated the genus into several closely allied genera,

<sup>5</sup> Raf. Med. Fl. 1: 196. 1828.

<sup>6</sup> Benth. Pl. Hartw. 322. 1839.

<sup>7</sup> Griseb. Gen. et Sp. Gent. 330. 1839.

<sup>8</sup> Griseb. in Hook. Fl. Bor.-Am. 2: 65-67. 1840.

<sup>9</sup> Griseb. in DC. Prodr. 9: 131. 1844.

<sup>10</sup> Hook. Kew. Jour. 3: 288. 1851.

<sup>11</sup> Torr. in Pacif. R. R. Rept. 4: 126. 1856.

<sup>12</sup> Torr. Bot. Mex. Bound. Surv. 156. 1859.

<sup>13</sup> Kell. in Proc. Calif. Acad. Sci. 2: 142. 1862.

<sup>14</sup> Rydb. Fl. Rocky Mts. 664-666. 1917, and ed. 2, 664-666. 1922.

namely, *Frasera*, *Tessaranthium* and *Leucocraspedum*; on the other hand, Gilg,<sup>15</sup> in Engler and Prantl, 'Die Natürlichen Pflanzenfamilien,' and Jepson<sup>16</sup> in his recent 'Manual' have merged the genus *Frasera* and its segregates with *Swertia*.

#### GENERAL MORPHOLOGY

*Roots*.—The prevailing root type in the genus *Frasera* is the tap-root. In the majority of species this tap-root grades directly into the stem, but in some of the western species, particularly *F. nitida*, *F. montana*, and *F. neglecta*, the root grades into a branching underground rhizome before being transformed into the aerial stem. The former group is therefore composed of biennial or short-lived species, whereas the latter is composed of perennials. Occasionally the biennial species may persist for more than two years, but that phenomenon is evidently never accompanied by the formation of a true rhizome as in the strictly perennial species.

The tap-root may be greatly thickened and fleshy, as in the species *F. caroliniensis*, *F. fastigiata*, and *F. speciosa*, or relatively slender and fibrous, as in *F. paniculata*.

*Stems*.—An herbaceous aerial stem terminates the unbranched crown of the root in the biennial or short-lived species. In the perennial species, however, the existence of the underground branching rhizome is a striking feature. The aerial stems show but slight variation, all being uniformly simple, erect, terete, and frequently strongly fistulose. The surface may be glabrous, glaucous, or variously pubescent. The height of the stem varies with the species. *Frasera caroliniensis* and *F. speciosa* have the highest stems, frequently reaching two or three meters. The far-western species are less conspicuous and rarely exceed one-half meter in height.

The stems of *F. caroliniensis*, *F. fastigiata*, and *F. speciosa* are truly foliose, the leaves ascending the stem at regular nodes, and grading into the foliaceous bracts of the inflorescence. In the remaining species, however, the stem may be described as scapose or subscapose, for the foliage is almost entirely limited to a basal

<sup>15</sup> Gilg. in Engl. & Prantl, Nat. Pflanzenfam. 4<sup>e</sup>: 87. 1895.

<sup>16</sup> Jepson, Man. Fl. Pl. Calif. 766. 1925.

rosette, the stem proper being naked or only bearing isolated and conspicuously reduced leaves at irregular intervals.

*Leaves.*—The simple, entire leaves are opposite or in whorls of three to six, disposed on an upright stem or forming a basal rosette, and are either sessile or petiolate. They vary in outline from ovate to almost linear. The margins of the leaves in certain species, such as *F. albomarginata*, often become conspicuously whitened and minutely tuberculate or papillate. While some of the plants of this group are glabrous throughout, certain species have a scaberulent tomentum. The texture of the leaves in the fresh state is with few exceptions somewhat fleshy; the leaves of dried pressed specimens, however, are more or less membranous. The venation of the leaves of the various species is characteristic; in *F. caroliniensis* and *F. fastigiata* a conspicuous midrib is developed, presenting a penninerved appearance, whereas in certain other species the veins are more or less parallel.

*Inflorescence.*—The mode of inflorescence is cymose and among the different species assumes characteristic modifications which have been found to be of taxonomic value. Text-figure 1 shows a diagram of the various types of inflorescence occurring in the genus. Each diagram represents a single axillary unit of inflorescence, b-b' representing the subtending leaves. In fig. 5 the condition of the leaf, b-b', subtending a single, much-branched peduncle, is here interpreted as a primitive inflorescence. Figures 4, 3, 2, and 1 show a progressive sequence in inflorescence specialization which culminates in the advanced type<sup>17</sup> illustrated in fig. 1, in which several relatively disorganized peduncles and solitary flowers are borne in the axil of the subtending leaf (b-b'). The development of the advanced types is probably due to a successive shortening or a submergence of the primary axes of the simple axillary inflorescences until finally only the tips, or pedicels, remain distinct, giving the inflorescence a fasciculate appearance. The single axillary inflorescence type is exemplified by *F. paniculata* although the main axis is cymose. In *F. Parryi*, however, the main axis is unbranched, and the flowers are borne in a raceme.

<sup>17</sup> Parkin, J. The evolution of the inflorescence. Jour. Linn. Soc. Bot. 42: 511-563. 1914.



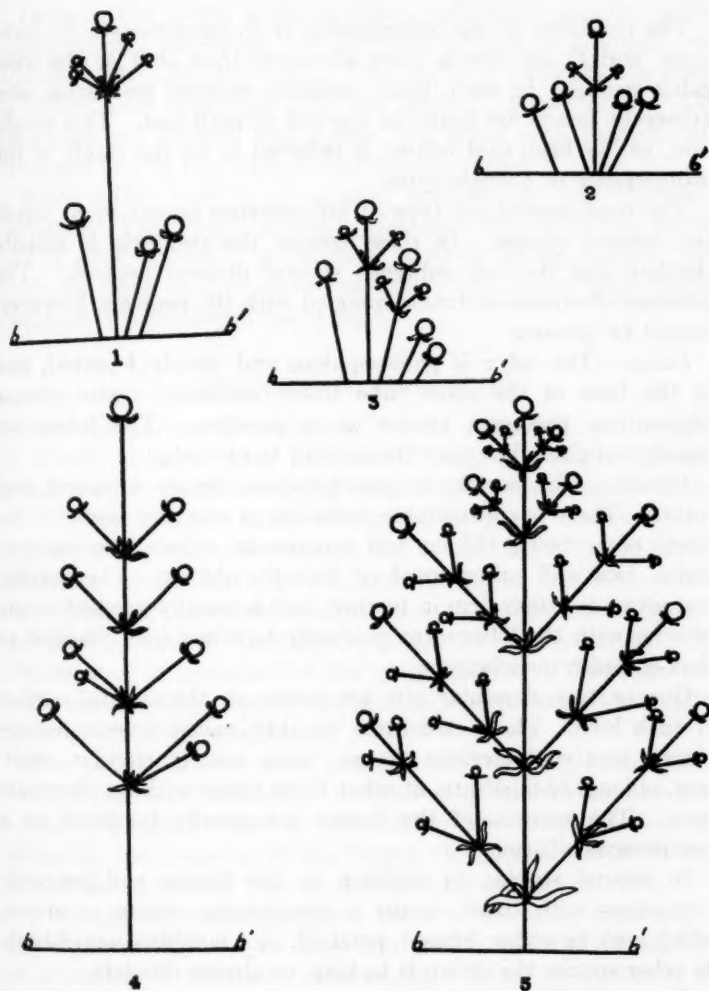


Fig. 1. Diagrams showing the various types of inflorescence within the genus *Frasera*:

1. *F. nitida*.

2. *F. speciosa*.

3. *F. caroliniensis*.

4. *F. Parryi*.

5. *F. albomarginata*.

The condition of the inflorescence of *F. caroliniensis*, *F. fastigiata*, and *F. speciosa* is more advanced than that of the foregoing species. In each, many pedicels, reduced peduncles, and numerous bracts are found in the axil of each leaf. This condition, as has been said before, is believed to be the result of the submergence of a single cyme.

The most specialized type of inflorescence occurs in *F. nitida* and related species. In these species the peduncle is usually obsolete and the leaf subtends several distinct pedicels. The presence of numerous bracts mingled with the pedicels, however, cannot be ignored.

*Calyx*.—The calyx is gamosepalous and deeply 4-parted, and at the base of the short tube there frequently occur minute filamentous processes known as squamellae. The lobes are usually subulate, but vary from linear to obovate.

*Corolla*.—The corolla is gamopetalous, deeply 4-parted, and rotate. There is considerable variation in size and shape of the lobes, some being oblong and mucronate, others obovate and acute, and still others oval or broadly oblong. The corolla, moreover, is rather firm in texture, and is usually greenish-white in color with the lobes often profusely blotched with blackish or dark-greenish maculations.

One or two glandular pits are borne on the ventral surface of each lobe. These structures (pl. 14), called foveae, assume bizarre and characteristic shapes, being usually circular, sagittate, oblong, or quadrate, at other times linear with an obcordate apex. The margins of the foveae are usually bordered by a conspicuous ciliation.

In several species, in addition to the foveae and generally contiguous with them, occurs a conspicuous *corona* or crown, which may be either fringed, petaloid, or a combination of both. In other species the crown is lacking, or almost obsolete.

*Stamens*.—There are four stamens, alternate with the lobes of the corolla. The filaments are inserted at the very base of the obscure tube, are about as long as the corolla, and linear or somewhat dilated at the base. The anthers are two-celled, oblong, versatile, extrorse, and longitudinally dehiscent. The pollen is granular.

*Ovary*.—The ovary is bicarpellary, unilocular, usually ovate-fusiform, and subsessile; the terminal portion is gradually attenuated into a filiform style. The stigma is two-cleft, the plane of either lobe coinciding with the plane of placentation. The placentae are parietal and binate, and upon each placenta are arranged two to four rows of anatropous ovules.

*Fruit*.—The fruit is a capsule, enclosed by the persistent perianth. The capsule is usually flattened parallel to the valves, but in some species it is flattened contrary to the valves. The seeds are numerous, ovate or triangular, flat, and in some species variously winged about the margin.

#### GEOGRAPHICAL DISTRIBUTION

The distribution of the genus *Frasera* is limited to the region of North America lying between 25° and 50° North latitude, which is approximately coincident with the northern and southern boundaries of the United States. The genus occurs in two distinct areas, one in the eastern and southeastern United States, extending as far north as southern Michigan and west to the eastern limit of the great plains region, the other extending from the one hundredth meridian west to the Pacific coast. The former area is occupied by the single species, *F. caroliniensis*, while the remaining species are confined to the latter area, as the accompanying map indicates.

The genus at one time probably had a continuous trans-continental distribution and its present occurrence in two such widely separated areas is presumably the result of isolation following the invasion of the Upper Cretaceous sea which separated the continent into an eastern and western portion.

Although the western species seem to be more abundant at the higher altitudes, yet they are able to maintain themselves in a variety of habitats. The changes in the character of the plants are the results of the various environmental factors, soil, moisture, altitude, etc. *Frasera fastigiata*, for instance, grows in rich, moist valleys, developing thin membranous leaves, whereas the species of the mountainous and desert regions have a decidedly fleshy or coriaceous texture.



Fig. 2.

Fig. 2. Map showing the distribution of the genus *Frasera* in North America.





Among the western species there are two lines of descent, one represented by the coastal species and the other by the more inland forms. The most primitive of the more coastal species is considered to be *F. nitida*, with a corona and two variously fused foveae. *Frasera neglecta*, with two more or less fused foveae, is probably a lateral offshoot from *F. nitida*. The second line of development begins with *F. speciosa*, the most primitive of the species in the genus because of its corona and two distinct

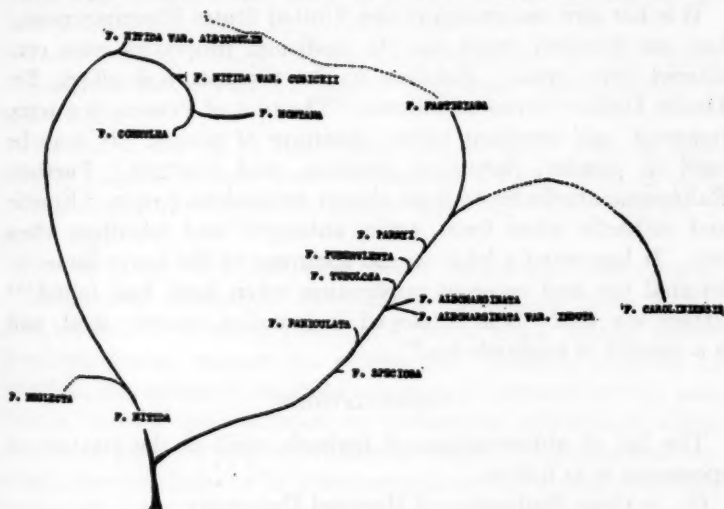


Fig. 4. Diagram showing probable lines of development within the genus *Frasera*.

foveae, as well as the somewhat primitive type of inflorescence in which only partial submergence of the peduncles occurs. *Frasera paniculata* and *F. albomarginata* are the least removed from *F. speciosa*. In the two former species the foveae have become variously fused. A more advanced condition is that represented by *F. Parryi* and *F. puberulenta*, with only a single variously cleft or lobed fovea. *Frasera fastigiata* and *F. carolinensis* with a single fovea and a more advanced type of inflorescence culminate this line of descent.

These two lines of development within the genus, as illustrated in the accompanying charts (figs. 3 and 4) and distribution map

(fig. 2), are more or less paralleled by the geographical range of the various species.

#### MEDICINAL USAGE

In the early part of the nineteenth century *Frasera* was variously known as "American Colombo," "Colombo-root," "Columbia," "Indian Lettuce," "Yellow Gentian," "Golden Seal," "Curcuma," "Meadow Pride," "Pyramid," etc.

It is not now recognized in the 'United States Pharmacopoeia,' but one hundred years ago its medicinal properties were considered very great. Relative to its therapeutical effect, Dr. Daniel Drake<sup>18</sup> writes as follows: "The root of *Frasera* is a pure, powerful, and excellent bitter, destitute of aroma. It may be used in powder, decoction, infusion, and tincture." Further, Rafinesque attributes to it an almost miraculous power: "Emetic and cathartic when fresh, tonic, antiseptic and febrifuge when dry. It has cured a wide spread gangrene of the lower limbs by internal use and external application when bark had failed."<sup>19</sup> Others say that "it is employed in jaundice, scurvy, gout, and is a specific in hydrophobia!"

#### ABBREVIATIONS

The list of abbreviations of herbaria used in the citation of specimens is as follows:

- G = Gray Herbarium of Harvard University.
- F = Field Museum of Natural History.
- C = University of California.
- M = Missouri Botanical Garden.
- LA = Los Angeles Museum.

#### TAXONOMY

*Frasera* Walt. Fl. Carol. 87. 1788; Michx. Fl. Bor.-Am. 1: 96. 1803; Pursh, Fl. Am. Sept. 1: 101. 1814; Raf. Med. Fl. 1: 196. 1828; Benth. Pl. Hartw. 322. 1839; Griseb. Gen. et Sp. Gent. 330. 1839; in Hook. Fl. Bor.-Am. 2: 66. 1840; in DC. Prodr. 9: 131. 1845; Benth. & Hook. Gen. Pl. 2: 817. 1876;

<sup>18</sup> Drake in Barton, Veg. Mat. Med. U. S. 2: 109. 1818.

<sup>19</sup> Raf. Med. Fl. 1: 199-200. 1828.

Gray, Syn. Fl. N. Am. 2<sup>1</sup>: 111, 125. 1878, and ed. 2, 2<sup>1</sup>: 111, 125. 1886; Chapman, Fl. S. U. S., ed. 3. 340. 1897; Howell, Fl. N. W. Am. 447. 1897; Piper in Contr. U. S. Nat. Herb. 11: 451. 1906; Gray, Man. Bot., ed. 7, 659. 1908; Britt. & Brown, Ill. Fl. 3: 14. 1913; Small, Fl. S. E. U. S. 931. 1913; Wootton & Standl. in Contr. U. S. Nat. Herb. 19: 499. 1915; Rydb. Fl. Rocky Mts. 664. 1917, and ed. 2, 664. 1922; Tidestrom in Contr. U. S. Nat. Herb. 25: 417. 1925; Jepson, Man. Fl. Pl. Calif. 765. 1925.

*Mesadenia* Raf. Med. Fl. 1: 198. 1828.

*Tesseranthium* Kellogg in Proc. Calif. Acad. Sci. 2: 142. 1862.

*Tessaranthium* Rydb. Fl. Rocky Mts. 666. 1917, and ed. 2, 666. 1922.

*Sweetia* L. acc. to O. Ktze. Rev. Gen. 2: 430. 1891, in part; Gilg in Engl. & Prantl, Nat. Pflanzenfam 4<sup>2</sup>: 87. 1895, in part.

*Leucocraspedum* Rydb. Fl. Rocky Mts. 665. 1917, and ed. 2, 665. 1922.

*Swertia* L. acc. to Jepson, Man. Fl. Pl. Calif. 766. 1925, in part.

Herbaceous caulescent biennials or perennials from a tap-root, sometimes forming rhizomes. Stems erect, simple, terete, fistulous, leafy, scapose to subscapose. Leaves opposite or whorled, lanceolate to spatulate, sessile or narrowed at the base into a petiole, membranous or coriaceous, sometimes white-margined, penninerved to subparallel-veined. Inflorescence terminal, flowers disposed in a subcorymbose, thyrsoidal or loosely paniculate cyme. Calyx 4-parted, the lobes deeply cleft, subulate, acute. Corolla rotate, 4-parted nearly to the base; the tube shallow, flat, with or without a conspicuous crown; the lobes convolute in the bud and bearing on the ventral surface one or two more or less fringed glandular foveae. Stamens four, inserted on the corolla tube and alternate with the lobes; filaments linear or somewhat dilated at the base; anthers 2-celled, oblong, versatile, extrorse, longitudinally dehiscent. Ovary bicarpellary, unilocular, the terminal portion gradually attenuate into a filiform style; stigma 2-cleft; placentae parietal, binate, bearing numerous anatropous ovules. Capsule ovate, bivalvate, compressed either parallel or contrary to the valves, 4-20-seeded. Seeds ovate, triangular, flat, pitted, variously winged or rugose. Embryo erect.

Type species: *Frasera caroliniensis* Walt. Fl. Carol. 87. 1788.

# KEY TO THE SPECIES

- A. Plant not scapose; inflorescence foliaceous-bracteate throughout; leaves not white-margined.
  - B. Corolla-lobe bearing a pair of foveae upon its ventral surface; crown conspicuous; capsule flattened contrary to the valves... 1. *F. speciosa*
  - BB. Corolla-lobe bearing a single fovea upon its ventral surface; crown inconspicuous or lacking; capsule flattened parallel to the valves.
    - C. Inflorescence relatively loose, leafy; pedicels exceeding the flowers; corolla-lobes oblong-ovate, 1-2 cm. long; species mostly of the southeastern United States..... 2. *F. caroliniensis*
    - CC. Inflorescence relatively compact, bracteate; pedicels shorter than the flowers; corolla-lobes oblong-lanceolate, 0.8-1 cm. long; species of the northwestern United States..... 3. *F. fastigiata*
- AA. Plants scapose to subscapose; inflorescence not foliaceous-bracteate throughout; leaves may or may not be conspicuously white-margined.
  - B. Perennials from a branching somewhat woody rhizome; leaves opposite.
    - C. Basal leaves lance-attenuate to oblanceolate, 5-20 cm. long.
      - D. Plants 3 dm. or more high; flowers several in the axils.
        - E. Lower branches of the inflorescence long-pedunculate, 5-10 cm. long; flowers relatively large..... 4. *F. neglecta*
      - EE. Lower branches of the inflorescence short-pedunculate, 1-1.5 cm. long; flowers relatively small.
        - F. Inflorescence about 3 cm. in diameter..... 5. *F. montana*
        - FF. Inflorescence about 2 cm. in diameter.
          - G. Plants glabrous..... 6. *F. nitida*
          - GG. Plants more or less pubescent..... 6a. *F. nitida* var. *albicaulis*
      - DD. Plants from 1.5-2.5 dm. high; flowers one or two in the axils.
        - E. Inflorescence dense..... 6b. *F. nitida* var. *Cusickii*
      - EE. Inflorescence open..... 7. *F. coerulesa*
    - CC. Basal leaves spatulate, 4-9 cm. long..... 8. *F. tubulosa*
  - BB. Perennials from a somewhat woody tap-root; leaves opposite.
    - C. Inflorescence a paniculate cyme; crown absent; fovea oblong.....
      - ..... 9. *F. puberulenta*
    - CC. Inflorescence a corymbose cyme; crown present; fovea lunate.....
      - ..... 10. *F. Parryi*
- BBB. Perennials from a somewhat woody tap-root; leaves whorled.
  - C. Pedicels 0.5-0.6 cm. long; fovea not two-parted, apical tooth lacking.
    - D. Plants glabrous throughout..... 11. *F. albomarginata*
    - DD. Plants glandular-puberulent throughout.....
      - ..... 11a. *F. albomarginata* var. *induta*
  - CC. Pedicels 2-4 cm. long; fovea usually deeply 2-parted, with a conspicuous apical tooth..... 12. *F. paniculata*

1. *F. speciosa* Dougl. in Hook. Fl. Bor. Am. 2: 66. 1840; Wats. Bot. Wheeler Exp. 279. 1871; Gray, Syn. Fl. N. Am. 2: 125. 1878; Coulter, Man. Bot. Rocky Mt. 246. 1885; Nels.

in Coult. & Nels. Man. Bot. Cent. Rocky Mts. 384. 1909;  
Wooton & Standl. in Contr. U. S. Nat. Herb. 19: 500. 1915;  
Tidestrom in Contr. U. S. Nat. Herb. 25: 417. 1925; Garrett,  
Spring Fl. Wasatch Reg. 119. 1927. Pl. 14, fig. 4.

*Tessaranthium radiatum* Kellogg in Proc. Calif. Acad. Sci. 2:  
142. 1862.

*Sweetia radiata* (Kellogg) O. Ktze. Rev. Gen. 2: 430. 1891.

*Frasera speciosa* Dougl. var. *scabra* Jones, Zoe 4: 277. 1893;  
Nels. in Coult. & Nels. Man. Bot. Cent. Rocky Mts. 384. 1909.

*F. venosa* Greene, Pittonia 4: 185. 1900; Wooton & Standl.  
in Contr. U. S. Nat. Herb. 19: 500. 1915.

*F. macrophylla* Greene in Pittonia 4: 186. 1900.

*F. ampla* Greene, *ibid.*

*F. speciosa* Dougl. var. *stenosepala* Rydb. in Bull. Torr. Bot.  
Club 31: 632. 1905.

*F. speciosa* Dougl. var. *angustifolia* Rydb. *ibid.*

*F. stenosepala* Rydb. *ibid.* 33: 149. 1906; Wooton & Standl.  
in Contr. U. S. Nat. Herb. 19: 500. 1915.

*F. angustifolia* Rydb. in Bull. Torr. Bot. Club 33: 149. 1906.

*Tessaranthium macrophyllum* (Greene) Rydb. Fl. Rocky Mts.  
666. 1917, and ed. 2, 666. 1922.

*T. speciosum* (Dougl.) Rydb. *ibid.*

*T. scabrum* (Jones) Rydb. *ibid.*

*T. stenosepalum* Rydb. *ibid.*

*T. angustifolium* Rydb. *ibid.*

Biennials or short-lived perennials from a thickened, somewhat woody tap-root; stem 0.3-2 m. high, erect, unbranched, foliose, terete, glabrous to scabrous; leaves in whorls of 3-4, membranous, entire, strongly parallel-veined, usually somewhat scabrous or puberulent, occasionally glabrous or glabrate; the basal leaves oblong to oblanceolate, spatulate, 25-50 cm. long, 3-9 cm. broad, gradually narrowed into an obscure, winged petiole; the cauline leaves sessile, linear to oblong-lanceolate, 5-15 cm. long, 1-2.5 cm. broad; inflorescence a terminal, cymose, fasciculate panicle; the pedicels clustered, 1-8 cm. long; the bracts opposite or 3-4-whorled, linear to lanceolate, 2-10 cm. long; calyx-lobes nearly distinct, linear to lanceolate, subulate, 1.5-2.5 cm. long; corolla-lobes deeply cleft, ovate to oblong-ovate, 1.5-2.5 cm. long, 0.5-

0.8 cm. broad, usually somewhat tapered at the apex, white or somewhat greenish, frequently maculate, bearing a pair of fimbriate, oblong foveae upon the ventral surface; fringe of the crown 3-5 mm. long, almost equalling the length of the foveae; capsule 2-2.5 cm. long, 1-1.5 cm. broad, partially enclosed within the persistent perianth, compressed contrary to the valves.

Distribution: from the Black Hills of South Dakota, south to New Mexico, west to California, Oregon, and Washington. A montane species occurring chiefly at altitudes from 5000-9000 feet.

Specimens examined:

SOUTH DAKOTA: Piedmont, 1893, *Pratt* (C); Black Hills National Forest, 15 June 1910, *Murdoch* 4098 (F).

MONTANA: July 1894, *Mrs. Moore* (M); Belt Mountains, 12 July 1860, *Hayden* (M); Henry's Lake and Mt. Chauvet, 29 July 1897, *Rydberg & Bessey* 4698 (F); Helena, June 1891, *Kelsey* (F); Helena, July 1892, *Starz* (F); head of Prickly Pear Creek, July 1883, *Scribner* 156 (F, G).

WYOMING: Laramie Peak, Albany Co., open foothills, 10 July 1900, *A. Nelson* 7516 (M, G); Medicine Bow Mt., Aug. 1856, *H. Engelmann* (M); Mammoth Hot Springs, moist open slopes, 1 July 1899, *Nelson & Nelson* 5629 (M, G); Jackson's Hole, 21 Aug. 1894, *A. Nelson* 935 (M, G); French Creek, near Laramie, 28 June-1 Aug. 1899, *Pammel* 42 (M); head of Powder River and along Big Horn Mountains, Sept. 1859, *Hayden* (M).

COLORADO: Estes Park, Larimer Co., 16 June 1916, *E. L. Johnston* 770B (M); rocky banks near Tolland, Gilpin Co., 25 June 1926, *E. J. Palmer* 31322 (M); Rollinsville, dry open plains, alt. 8500 ft., 9 July 1913, *Overholts* (M); Tongue Creek, Mesa, Delta Co., alt. 8000-9000 ft., Aug. 1892, *Purpus* 304 (M); The Craggs, 14 July 1901, *Clements & Clements* 192 (M, G); mountains, Larimer Co., 1 July 1896, *Crandall* (M); Camerons Cove, Aug. 1900, *Harper & Harper* 4959 (F); mountain-sides near Empire, 3 Aug.-8 Sept. 1892, *Patterson* 243 (G, F, M); South Park, June 1873, *Wolf* (F); Keblar Pass, 14 Aug. 1901, *C. F. Baker* 947 (M); Bob Creek, W. La Plata Mts., alt. 10,000 ft., 30 June 1898, *Baker, Earle & Tracy* 271 (M, F, G); from the head-waters of Clear Creek and the alpine ridge lying east of "Middle Park," 1861, *Parry* 310 (M, G); Ute Pass, 30 June 1886, *Trelease* (M);



arid slopes of Douglas Mt., Empire, 12 Aug. 1874, *G. Engelmann* (M); flank of Snowy Range, wet mountain valleys, alt. 9000 ft., 24 July 1872, *Redfield* (M); rocky summits above Idaho, alt. 8000–8500 ft., 31 July 1874, *G. Engelmann* (M); Stove Prairie Hill, 1 July 1896, *Crandall 1490* (F); Pike's Peak, 1890, *Carleton* (C); region of Pike's Peak, alt. 6000–13000 ft., July–Aug. 1912, *Brumbach & Davies 115* (F); near Manitou, alt. 7200 ft., 11 July 1884, *Letterman 309* (M, F); river bottom, Bayfield, 9 Aug. 1917, *Payson & Bethel 1153* (M); Middle Mountains, 1862, *Hall & Harbour 553* (F); Pagosa Springs, 25 July 1899, *C. F. Baker 524* (G); near Pagosa Peak, alt. 10000 ft., Aug. 1899, *C. F. Baker 525* (M); Keblar Pass, alt. 10000 ft., 14 Aug. 1901, *C. F. Baker* (G).

NEW MEXICO: Winsor Creek, in the Pecos River National Forest, alt. 8600 ft., 29 June 1908, *Standley 4034* (F, G); in and around the south end of the Black Range, Kingston, Sierra Co., alt. 6600 ft., 13 July 1904, *Metcalfe 1160* (M, G); vicinity of Las Vegas, San Miguel Co., Aug. 1923, *Anect 134* (M); Hermits Peak, Aug. 1884, *Snow* (M); Sandia Mts., 23 July 1903, *Hedgcock* (M); in forest of Douglas spruce and rock pine, Haynes Canyon, Alamo National Forest, 10 Aug. 1911, *Barlow* (F); in Grant Co., in the vicinity of Silver City, Fort Bayard, Santa Rita, Fierro, and on the GOS Ranch near Hodge's house, 27 Aug.–12 Sept. 1911, *Holzinger* (M); Balsam Park, Sandia Mts., alt. 8200 ft., 4 July 1914, *Ellis 152* (M); in the Mogollon Mts., on or near the west fork of the Gila River, Socorro Co., alt. 7500 ft., 7 Aug. 1903, *Metcalfe 411* (M, G); valley of Santa Fe Creek, June 1847, *Fendler 686* (M).

IDAHO: wooded slope, Salmon, Lemhi Co., alt. 5500 ft., 4 July 1920, *Payson & Payson 1893* (M); 4 miles south of Ketchum, 23 July 1895, *Henderson 3558* (M).

UTAH: alpine rocky crests, Dyer Mine, Uintah Mts., 5 July 1902, *Goodding 1255* (M, G); in the vicinity of Clayton Peak, Wasatch Mts., alt. 9000 ft., 12–26 Aug. 1903, *Stokes* (M); gravel, Fish Lake, alt. 10000 ft., 2 Aug. 1894, *M. E. Jones 5710* (M); Salt Lake City and vicinity, 7 July 1908, *Clemens* (M, G); American Fork Canyon, alt. 7500 ft., 27 July 1880, *M. E. Jones 1878* (M).

ARIZONA: Pine, *M. E. Jones* (M); Rincon Mts., 1891, *Neally 81* (M); Willow Spring, July 1874, *Rothrock 251* (M, F); without locality, 1877, *E. Palmer 304* (M); near soldier's camp, Santa Catalina Mts., 13 July 1916, *Harris C. 16296* (M); moist soil, Huachuca Mts., alt. 8000 ft., 8 July 1884, *Pringle* (M, G); in the vicinity of Flagstaff, alt. 7000 ft., 5 July 1898, *MacDougal 236* (M, G); Chiricahua Mts., alt. 8500 ft., 13 Aug. 1907, *Blumer 1619* (M).

WASHINGTON: Yakima region, 1882, *T. S. Brandegee 14840* (M).

OREGON: moist borders of pine woods, Bates Lumber Co., near Austin, E. Grant Co., 5 June 1925, *Henderson 5324* (M, G); Steins Mts., opposite Devine Ranch, along streams, alt. 1890 m., 7 July 1896, *Leiberg 2426* (M, G).

CALIFORNIA: Faith Valley, Alpine Co., alt. 8000 ft., Aug. 1892, *Hansen 595* (M); south fork of San Joaquin River, alt., 9000 ft., July 1900, *Hall & Chandler 716* (M); near Yosemite, Sierra Nevada, 1875, *Muir 5024* (M); about Summit Lake, near the summit of Mt. Sanhedrin, 15 July 1902, *A. A. Heller 5883* (M, G); without locality, 186-, *Bolander 6361* (G).

2. *F. caroliniensis* Walt. Fl. Carol. 87. 1788; Torr. Fl. N. & M. U. S. 187. 1824; Torr. Fl. N. Y. 2: 109. 1843; Gray, Man. Bot., ed. 7, 659. 1908. Pl. 14, fig. 6.

*Swertia difformis* L. Sp. Pl. ed. 1, 1: 226. 1753, and ed. 2, 1: 328. 1762.

*Frasera Walteri* Michx. Fl. Bor.-Am. 1: 97. 1803; Barton, Veg. Mat. Med. U. S. 2: 103. 1818; Ell. Sketch Bot. S. Car. & Ga. 205. 1824; Darby, Bot. S. States, 437. 1855.

*F. officinalis* Barton, Fl. Virg. 49. 1812.

*Swertia Frasera* Sm. in Rees, Cycl. 34: 1819.

*Frasera verticillata* Raf. Med. Fl. 1: 196. 1828.

"*Frasera carolinensis* Walt." acc. to Hook. Fl. Bor.-Am. 2: 66. 1840; Chapman, Fl. S. U. S. ed. 2, 357. 1889; Small, Fl. S. E. U. S. 931. 1903, and ed. 2, 931. 1913; Britt. & Brown, Ill. Fl. 3: 15. 1913.

*Sweetia carolinensis* O. Ktze. Rev. Gen. 2: 430. 1891.

Perennials from a much-thickened, somewhat woody tap-root; stem 1-1.5 m. high, erect, unbranched, foliose, terete, glabrous; leaves in whorls of 3-5 (usually 4), membranous, entire, penni-

nerved, glabrous; the basal leaves obovate to oblanceolate, 20–35 cm. long, 4–8 cm. broad, gradually narrowing into an obscure petiole; the cauline leaves sessile, oblong-lanceolate, 5–20 cm. long, 1–5 cm. broad; inflorescence a terminal, compound, open paniculate cyme; the peduncles clustered, 4–12 cm. long; the foliaceous bracts opposite or 3–4-whorled, lanceolate, 2–10 cm. long; calyx-lobes nearly distinct, lanceolate, mucronate, somewhat subulate, 20 mm. long, 2 mm. broad; the corolla-tube shallow, lacking a conspicuous crown; the lobes deeply cleft, ovate, 10–20 mm. long, 4 mm. broad, tapered at the apex, light greenish-yellow, marked with small brown-purple dots, bearing on the ventral surface a single, circular, fimbriate fovea; capsule 2 cm. long, 1 cm. broad, flattened parallel to the valves, partially enclosed within the persistent perianth; seeds dark brown, oblong, 0.9–1 cm. long, 0.4–0.5 cm. broad, pitted, conspicuously winged.

Distribution: from the Carolinas north to Michigan and west to Missouri. A species usually occurring in rich soil of open woodlands.

Specimens examined:

NORTH CAROLINA: mountains of North Carolina, 1878 (F).

GEORGIA: Estatoah Falls on Mud Creek, Rabun Co., alt. 3000 ft., 12 Aug. 1893, *Small* (M, F).

ALABAMA: Lookout Mt., Collinsville, De Kalb Co., 29 June 1897, *Eggert* (M).

MISSISSIPPI: Agric. College, Oktibbeha Co., 10 May 1892, *Tracy* 1348 (M).

MICHIGAN: dry open woods, Kalamazoo Co., 27 July 1874, *Tuthill* 9 (F); roadsides, Jackson Co., 22 June 1897, *Camp & Camp* (M, F); Jackson Co., 11 June 1897, *Camp & Camp* (M).

INDIANA: Hanover, May 1882, *Young* (M).

KENTUCKY: margins of woods, along small streams, near Dawson Springs, Caldwell Co., 29 May 1920, *E. J. Palmer* 17689 (M); rocky fields, roadsides, Bowling Green, 1 June 1893, *Price* (M).

TENNESSEE: open woods, Lookout Mt., near Chattanooga, 17 May 1911, *Churchill* 659 (M); wooded slope, Lookout Mt., near Chattanooga, 20 May 1911, *Churchill* (M).

ILLINOIS: Carbondale, 1871, *French* (M); rocky hills, Belknap, Pulaski Co., 13 May 1919, *E. J. Palmer 15132* (M); open woods about Belleville, May 1846, *Hilgard* (M); open woods east of Belleville, June 1834, *G. Engelmann 441* (M); Carbondale, 31 May 1885, *Wislizenus 343* (M).

MISSOURI: Big River, near Irondale, 24 May 1924, *Drushel* (M); Iron Mountain Lake, Iron Co., 28 May 1921, *Drushel* (M); rocky hills near Big River, St. Francois Co., 3 July 1892, *Eggert* (M); woods near Mine La Motte, Madison Co., 23 June 1898, *Eggert* (M); Bonne Terre, 31 Aug. 1891, *Eggert* (M); dry prairies, near Woodlawn, Jefferson Co., 16 May 1898, *Eggert* (M); De Soto, Jefferson Co., 25 May 1896, *Eggert* (M); rocky hillsides, Jefferson Co., 25 May 1896, *Eggert* (M); rocky hills, near Big River, St. Francois Co., 31 Aug. 1891, *Eggert* (M); "Stony hills," St. Francois Co., 31 Aug. 1891, *Eggert* (M); sandy ground, Scott Co., 20 May 1894, *Eggert* (M); rocky hillsides, near Big River, 31 Aug. 1891, *Eggert* (M); Mine La Motte, Madison Co., 19 May 1927, *Greenman, Larsen & Beardsley* (M); Iron Mountain Lake, 31 May 1925, *Kellogg 1931* (M); open woods along small streams, near Bismarck, St. Francois Co., 25 June 1920, *E. J. Palmer 18075* (M); 10 July 1887, *Hasse* (F); roadside, Des Arc, Iron Co., 6 May 1908, *H. H. Smith 405* (F); rocky, wooded hillsides near Shirley, Washington Co., 29 May 1924, *E. J. Palmer 25210* (M); Big River, Desloge and Bonne Terre, 28 Aug. 1898, *Trelease 1130* (M).

3. *F. fastigiata* (Pursh) Heller in Bull. Torr. Bot. Club 24: 312. 1897; Piper in Contr. U. S. Nat. Herb. 11: 451. 1906; Piper & Beattie, Fl. S. E. Wash. 193. 1914. Pl. 14, fig. 11.

*Swertia fastigiata* Pursh, Fl. Am. Sept. 101. 1814.

*Frasera thyrsiflora* Hook. Lond. Jour. Bot. 3: 288. 1851; Gray, Syn. Fl. N. Am. 2: 125. 1878; Howell, Fl. N. W. Am. 448. 1897.

"*Sweetia fastigiata* Pursch" acc. to O. Ktze. Rev. Gen. 2: 430. 1891.

Biennial or short-lived perennial from a thickened tap-root; stem 6-10 dm. high, erect, unbranched, foliose, terete, glabrous; leaves usually in whorls of 3, entire, membranous, penninerved,

glabrous; the basal leaves broadly obovate to oblanceolate, 15–30 cm. long, 5–10 cm. broad, narrowing into an obscure petiole; the cauline leaves subsessile, obovate, 4–12 cm. long, 1.5–6 cm. broad; inflorescence a terminal, interrupted, fasciculate, cymose panicle; the peduncles clustered, 2–6 cm. long; the bracts opposite, or 3–4-whorled, lanceolate, 2–10 cm. long; calyx-lobes almost distinct, somewhat subulate, 2 cm. long, 0.2 cm. broad; corolla-tube shallow, lacking a conspicuous crown; the lobes deeply cleft, oblong-lanceolate, 0.8–1. cm. long, 0.3 cm. broad, acute, pale blue, bearing on their ventral surfaces single, circular, fimbriate foveae; capsule 1.5 cm. long, 0.5 cm. broad, flattened parallel to the valves, partially enclosed within the persistent perianth; seeds oblong to oval or roughly triangular, 0.5–0.6 cm. long, 0.3 cm. broad, pitted or rugose, usually winged.

Distribution: northern Idaho and adjacent Washington.

Specimens examined:

IDAHO: on gravelly open hillsides, Moscow Hills, Latah Co., 25 June 1896, *Elmer 340* (M); Cedar Mts., Latah Co., June 1899, *Elmer 1688* (M); pine groves of foothills, Kamiac Buttes, June 1897, *Elmer 802* (M); Thatuna Hills, 5 July 1926, *Epling & Houck 9147* (M); about Lake Waha, Nez Perces Co., alt. 2000–3500 ft., 24 June 1896, *Heller & Heller 3285* (M); near Moscow and St. Maries R., 26 May–8 Aug. 1894, *Henderson 2271* (G); in low, rich woods, Kootenai Co., June 1891, *Leiberg 213* (M); Santianne Creek bottom, alt. 980 m., 25 June 1895, *Leiberg 1064* (M, G); Cedar Mts., Latah Co., 16 July–7 Aug. 1893, *Piper 1618* (M, F, G); meadows, Kootenai Co., June 1892, *Sandberg* (M); rich moist woods, Kootenai Co., June 1880, *Sandberg* (M, F); vicinity of Lake Waha, Nez Perces Co., 23 May 1892, *Sandberg, MacDougal & Heller 239* (F, G); base of mountains, near the Clearwater, 26 Aug. 1880, *Watson 270* (G).

WASHINGTON: Spokane Co., 1892, *Henderson 2271* (G); Clearwater, *Spalding* (G); damp grounds in open woods, Spokane Co., 5 June 1889, *Suksdorf 938* (F, M); damp grounds in open woods, Spokane Co., 5 June 1889, *Suksdorf 939* (G).

4. *F. neglecta* Hall in Bot. Gaz. 31:388. 1901. Pl. 14, figs. 8, 12.  
*Swertia neglecta* (Hall) Jepson, Man. Fl. Pl. Calif. 766. 1925.



Perennial from a rhizome; stem 3.0–4.0 dm. high, erect, unbranched, subscapose, terete, glabrous; leaves opposite, subcoriaceous, glabrous; the basal leaves almost sessile, linear, 5–18 cm. long, 0.4–0.8 cm. broad, with white, somewhat serrate, crisped margins, becoming entire towards the apex; the cauline leaves sessile, linear, 3–8 cm. long, 0.4–0.6 cm. broad; inflorescence an elongated, interrupted, fasciculate cyme; the peduncles clustered, 1–12 cm. long; the bracts foliaceous, somewhat scarious, sessile, linear, 2–10 cm. long, distinct or united at the base; calyx-lobes nearly distinct, conspicuously subulate, 0.5 cm. long, 0.1 cm. broad, scarious-margined; the corolla-tube shallow, lacking a conspicuous crown; corolla-lobes deeply cleft, oblong, acuminate, 0.8–1 cm. long, 0.4 cm. broad, greenish-white, purple-veined, bearing on the ventral surface an oblong fovea, the lower part of the fovea often continuous with the tissue of the petal, sometimes 2-toothed or 2-lobed, the upper part saccate with the marginally fimbriate, circular orifice somewhat raised above the petal-surface; capsule flattened parallel to the valves, partially enclosed within the persistent perianth.

Distribution: California, chiefly along the northern slopes of the San Bernardino Mountains.

Specimens examined:

CALIFORNIA: Swartout Canyon, desert slopes of the San Gabriel Mountains, alt. 6500 ft., 5 July 1908, *Abrams & McGregor 628* (G); Acton, Mt. Gleason, Los Angeles Co., June 1902, *Elmer 3609* (G); north fork, Mt. Pinos, Ventura Co., alt. 1750 m., 28 June 1905, *H. M. Hall 6462* (C, F); Swartout Canyon, alt. 6860 ft., 3–6 June 1900, *H. M. Hall 1496* (M, F, G, C TYPE); Holcomb Valley, San Bernardino Mts., alt. 8000 ft., June 1886, *Parish & Parish* (C); dry ridges, Holcomb Valley, San Bernardino Mts., Aug. 1882, *Parish & Parish 1474* (G); Holcomb Valley, San Bernardino Mts., alt. 7300 ft., 16 June 1916, *S. B. Parish 10921* (C).

5. *F. montana* Mulford in Bot. Gaz. 19: 119. 1894.

Pl. 14, fig. 15.

*Leucocraspedum montanum* (Mulford) Rydb. Fl. Rocky Mts. 665. 1917, and ed. 2, 665. 1922.



Perennial from rhizomes; stem 3.0–4.5 dm. high, 0.3–1 cm. thick at the base, erect, unbranched, subscapose, terete, glabrous; leaves opposite, entire, membranous, parallel-veined, glabrous; basal leaves narrowly oblanceolate, 3–12 cm. long, 0.3–0.5 cm. broad; cauline leaves linear, 3–12 cm. long, 0.2–0.3 cm. broad; inflorescence a terminal fasciculate cyme, about 3 cm. broad; peduncles clustered, 1–3 cm. long; bracts opposite, foliaceous, 2–4 cm. long; calyx-lobes almost distinct, narrowly subulate, 0.5 cm. long, 0.1 cm. broad; corolla-tube shallow, corona small, deeply cut into two or more setae; the lobes deeply cleft, oblong, somewhat acute, 0.8 cm. long, 0.2–0.3 cm. broad, creamy white, bearing on the ventral surface a single obovate, fimbriate, basally saccate fovea; capsule flattened contrary to the valves, partially enclosed within the persistent perianth.

Distribution: known only from "mountain beyond Pioneer," Idaho.

Specimens examined:

IDAHO; Pioneer, alt. 5000 ft., 26 July 1892, *Mulford* (F TYPE); mountain beyond Pioneer, 23 July 1892, *Mulford* (M, G).

6. *F. nitida* Benth. Pl. Hartw. 322. 1839; Brew. & Wats. Bot. Calif. 484. 1876; Gray, Syn. Fl. N. Am. 2<sup>1</sup>: 126. 1878; Howell, Fl. N. W. Am. 448. 1897; Piper in Contr. U. S. Nat. Herb. 11: 452. 1906. Pl. 14, figs. 13, 14.

*Svertia nitida* (Benth.) Jepson, Man. Fl. Pl. Calif. 766. 1925.

*Frasera nitida* Benth. var. *albida* Suksdorf, Werdenda 1: 30. 1927.

Perennial from a branching somewhat woody rhizome; stems 25–50 cm. high, 0.2–0.3 cm. in diameter at the base, erect, unbranched, subscapose, terete, glabrous; leaves opposite, entire, often conspicuously white-margined, parallel-veined, glabrous; the basal leaves spatulate to sublinear, 5–25 cm. long, 0.5–1 cm. broad; cauline leaves sessile, narrowly oblanceolate to sublinear, 5–10 cm. long, 0.3–0.5 cm. broad; inflorescence a terminal, interrupted, racemose cyme; peduncles clustered, 0.5–4 cm. long; bracts opposite, foliaceous, sublinear, 4–12 cm. long; calyx-lobes nearly distinct, somewhat subulate, tapering to a sharp point, 0.6–0.7 cm. long; corolla-tube shallow with a conspicuous petal-

loid corona; the lobes ovate to oblong, acute, 0.7–0.8 cm. long, 0.3 cm. broad, greenish, bearing on their ventral surfaces single, oblong, deeply fringed, saccate foveae; capsule 1.5 cm. long, 0.5 cm. broad, flattened parallel to the valves, partially enclosed within the persistent perianth; seeds few, often only four, oblong, 0.7 cm. long, 0.3 cm. broad, closely appressed, brown, thick-margined, wingless, pitted.

Distribution: western Idaho, west to southern Washington, south to southern California.

Specimens examined:

IDAHO: dry stony hills near Cuprum, 10 July 1899, *Cusick 2226* (C, F, G).

WASHINGTON: Klickitat, June 1879, *Howell* (M); Klickitat Co., 27 May–Aug. 1881, *Suksdorf 40* (G); hillsides, W. Klickitat Co., 27 May, *Suksdorf 161* (F); hillsides, W. Klickitat Co., 27 May 1881, *Suksdorf* (C).

OREGON: dry prairies, eastern Oregon, July 1880, *Howell* (F); open grassy hillsides, 13 May 1924, *Henderson 467* (M); Dalles, Wasco Co., 23 May 1910, *A. A. Heller 10087* (G); Siskiyou Mts. 19 Aug. 1880, *G. Engelmann* (M); Woodville, Jackson Co., 5 July 1893, *Hammond 277a* (M); near camp by Grizzly Butte, Crook Co., alt. 840 m., 14 June 1891, *Leiberg 227* (G, C); Oregon Boundary Commission, Columbia River, lat. 46–49° N., *Lyall 1860* (G); dry ground along Silvies River at mouth of Emigrant Creek, Harney Co., 25 June 1912, *Peck 4501* (F); Odessa, Short Creek Hill, Klamath Co., alt. 4200 ft., 30 June 1910, *Rose 1624* (M).

CALIFORNIA: Plumas Co., *Mrs. R. M. Austin* (F); gravelly red soil, alt. 4500 ft., 20 July 1893, *M. S. Baker* (C); Morley's Station, Shasta Co., 22 May 1894, *M. S. Baker & Nutting* (C); Cherokee, Butte Co., May 1879, *Bidwell* (G); Battle Rock Mt., Lake Co., 1 July, *K. Brandegee* (C); Prattsville, Plumas Co., 9 July 1892, *T. S. Brandegee* (C); south side of Mt. Shasta, Siskiyou Co., alt. 5000–10000 ft., 15–31 July 1897, *H. E. Brown 545* (F); dry land near Yreka, Siskiyou Co., 2 June 1910, *Butler* (C, M); Klamath River, Humboldt Co., alt. 1400 ft., June 1901, *Chandler 1486* (C, M); Hupa Indian Reservation, alt. 500 ft., June 1901, *Chandler 1383* (C); Castle Lake Trail, Shasta Region, Aug. 1910, *Congdon*

(C); lower slopes of Hoopa Mt., Humboldt Co., on the borders of Supply Creek, 21 June 1899, *Davy 5737* (C); Cantara, Siskiyou Co., 28 Aug. 1912, *Eastwood 1945* (G); Nevada City, Nevada Co., 20-22 June, 1912, *Eastwood 582* (C); Goose Valley, Shasta Co., 29 June-11 July 1912, *Eastwood 950* (G); Scotts Mt., alt. 5000-7000 ft., 30 Aug. 1880, *G. Engelmann* (M); near Yreka, Siskiyou Co., 14 June 1876, *Greene 856* (M); lava beds of north-eastern Shasta Co., alt. 4000 ft. alt., June 1903, *Hall & Babcock 4241* (C); Cobb Mt., 500 ft. below summit, 28 July 1913, *Hall 9594* (M, G, F, C); Bear River, Nevada County, alt. 1400 ft., 5 June 1916, *Hall 10157* (C); Coffee Creek Canyon, Salmon Mts., Trinity Co., alt. 1260 m., 16 July 1909, *Hall 8546* (G, M, F); Pitt River Canyon, alt. 1000 ft., June 1903, *Hall & Babcock 4006* (C); near Nash Mine, alt. 4100 ft., 16 July 1909, *Hall 8546* (C); near Redding, Shasta Co., 27 May 1905, *A. A. Heller* (C); grade between Greenville and Prattsville, Plumas Co., 12 July 1907, *Heller & Kennedy 8820* (G); near Redding, Shasta Co., 27 May 1905, *A. A. Heller 7879* (G); dry gravelly slope, north side of Mt. Eddy, Siskiyou Co., alt. 4500 ft., 16 July 1915, *A. A. Heller 12103* (F, M); Mt. Hanna, Lake Co., 15 July 1897, *Jepson* (G); near Prattsville, at Mt. Meadow, alt. 5500 ft., 2 July 1897, *M. E. Jones* (M); Redding, 16 May 1910, *W. W. Jones 222* (G); Sierra Co., 1874, *J. G. Lemmon* (C 174108); Holcomb Valley, San Bernardino Mts., alt. 8000 ft., Aug. 1882, *Parish & Parish 1474* (F); Redding, Shasta Co., 24 May 1913, *L. E. Smith 235* (G); Cobb Mt. on south side, alt. 2000 ft., 12 July 1905, *J. P. Tracy 2244* (C); Trinity Co., June 14, *Yates 19385* (C).

6a. Var. *albicaulis* (Dougl.) Card, n. comb. Plate 14, fig. 9.

*Frasera albicaulis* Dougl. ex Griseb. in Hook. Fl. Bor.-Am. 2: 67. 1840; Gray in Syn. Fl. N. Am. 2: 126. 1878; Howell, Fl. N. W. Am. 1: 449. 1897; Piper & Beattie, Fl. S. E. Wash. 193. 1914.

"*Frasera albicaulis* Griseb." Gen. et Sp. Gent. 330. 1839; in DC. Prodr. 9: 131. 1845.

*Sweetia albicaulis* Dougl. ex O. Ktze. Rev. Gen. 2: 430. 1891.

*Leucocraspedum albicaule* Dougl. acc. to Jepson, Man. Fl. Pl. Calif. 766. 1925.

*Frasera albicaulis* Dougl. f. *alba* St. John in Proc. Biol. Soc. Wash. 41: 196. 1928.

Plant more or less puberulent; corolla with a more linear fovea.

Distribution: northwestern Idaho, eastern Washington, and northern Oregon.

Specimens examined:

IDAHO: Palouse Country and about Lake Coeur d'Alene, June, July 1892, *Aiton* (M); in the vicinity of Moscow, Latah Co., 16-20 June 1892, *A. A. Heller* (F); Upper Ferry, Nez Perces Co., May 1896, *Heller & Heller* (F); about Lewiston, Nez Perces Co., alt. 900 ft., 20 May 1896, *Heller & Heller* (M); open hillsides, Salmon, Lemhi Co., alt. 5000 ft., 27 June 1920, *Payson & Payson 1796* (M); meadows, valley of Clearwater River, Nez Perces Co., 3 May 1892, *Sandberg, MacDougal & Heller 101* (M, F); moist places, Kootenai Co., June 1887, *Sandberg* (F).

WASHINGTON: on dry hillsides, Pullman, Whitman Co., May 1897, *Elmer 823* (M); grassy hillsides, head of Hotwai Creek, Whitman Co., 27 May 1928, *English 994* (M); Pullman, 20 June 1893, *Piper 1619* (M); Spokane Co., June 1884, *Suksdorf* (F); prairies, Spokane Co., June 1884, *Suksdorf* (F).

OREGON: slightly moist ground, 10 miles north of Bonanza, Klamath Co., 24 June 1927, *Peck 15174* (M); cattle camp at head of Horse Creek, Wallowa Co., alt. 5400 ft., 24 June 1897, *Sheldon 8344* (M); dry ground near the Dalles, 2 July 1927, *Thompson 2851* (M).

6b. Var. *Cusickii* (Gray) Card, n. comb.

Plate 14, fig. 10; pl. 15, fig. 1.

*Frasera Cusickii* Gray in Proc. Am. Acad. 22: 310. 1887; Howell, Fl. N. W. Am. 448. 1897.

Stems generally shorter than in the species, 15-20 cm. high; flowers larger, corolla-lobes 0.8-1 cm. long, 0.4 cm. broad.

Distribution: Idaho and Oregon.

Specimens examined:

IDAHO: open hillsides, Salmon, Lemhi County, alt. 5000 ft., 27 June 1920, *Payson & Payson 1796* (M).

OREGON: hillsides of Grande Ronde Valley, 1886, *Cusick 1427* (G TYPE); stony hillsides near Union, May 1886, *Cusick 1427* (C); sterile, stony ridges, southern Blue Mts., alt. 4000-5000 ft., June 1897, *Cusick 1635* (C, F, M); mountain sides of Grande Ronde Valley, near Union, 6 June 1898, *Cusick 1920* (F, G, M, C).

7. *F. coerulea* Mulford in Bot. Gaz. 19: 118. 1894.

*Leucocraspedum coeruleum* (Mulford) Rydb. Fl. Rocky Mts. 666. 1917, and ed. 2, 666. 1922.

Perennial from a branching rhizome; stem 1.5–2.5 dm. tall, erect, unbranched, foliose, terete, glabrous; leaves opposite, entire, membranous, white-margined, parallel-veined, glabrous; basal leaves narrowly oblanceolate, 5–20 cm. long, 0.5–1 cm. broad, petiole inconspicuous; cauline leaves sessile, linear, 4–8 cm. long, 5–6 cm. broad; inflorescence closely panicate; pedicels 0.5–3 cm. long, 2–4 in the axils; calyx-lobes nearly distinct, slightly subulate, 0.5–0.7 cm. long, 1 mm. broad, scarious-margined; corolla-tube deeply cleft, corona conspicuous, petaloid, nearly as long as the fovea; corolla-lobes ovate, acute, 6–8 mm. long, bearing upon the ventral surface a fimbriate, linear fovea; capsule and seed not seen.

Distribution: Owyhee Mts., in southeastern Idaho, and Oregon.

Specimens examined:

IDAHO: Owyhee Mts., near Wagonville, alt. 7000 ft., 8 July 1892, *Mulford* (M, G, COTYPES); dry open slopes, De Lamar, Owyhee Co., alt. 7000 ft., 22 June 1911, *Macbride* 961 (M, G, F).

OREGON: near camp by Grizzly Butte, Crook Co., alt. 840 m., 14 June 1894, *Leiberg* 227 (M): head of Otis Creek, Blue Mts., 11 June 1897, *Cusick* 1635 (G).

8. *F. tubulosa* Coville in Proc. Biol. Soc. Wash. 7: 71. 1891.

Pl. 14, fig. 5.

*Svertia tubulosa* (Coville) Jepson, Man. Fl. Pl. Calif. 767. 1925.

Biennial or short-lived perennial from a tap-root; stem about 6 dm. high, .6–1.0 cm. thick at the base, erect, unbranched, subscapose, terete, glabrous, glaucous; leaves in whorls of 5 or 6, entire, membranous, narrowly white-margined; basal leaves spatulate to oblanceolate, 4–9 cm. long, 1 cm. broad, obtuse, mucronate; inflorescence a terminal, narrow, spicate panicle 2–5 dm. long, interrupted below; the pedicels erect, 1–5 cm. long; bracts opposite, linear, 7–10 cm. long; calyx-lobes nearly distinct, linear, subulate, 0.6–0.8 cm. long; corolla-tube shallow; the lobes oblong-obovate, 0.8–1 cm. long, 0.2 cm. broad, acuminate, white,



bearing tubular foveae half as long as the corolla and saccate at the base, longitudinally 2-cleft at the apex; capsule oblong-lanceolate, 1 cm. long, .5 cm. broad, compressed parallel to the valves; seeds 6-10, oblong, flat and thin.

Distribution: Tulare and Inyo Counties, California.

Specimens examined:

CALIFORNIA: summit, west Olancha, Inyo Co., 21 June 1899, *S. W. Austin 117* (C); Kern River, Tulare Co., 3 Aug. 1904, *Culbertson 4329* (M, F, G); Kern River, Tulare Co., 3 Aug. 1904, *Eastwood 4329* (C); near Lion Meadow, basin of upper Kern River, Tulare Co., July 1904, *Hall & Babcock 5401* (C); Soda Springs, basin of upper Kern River, alt. 6300 ft., Tulare Co., July 1904, *Hall & Babcock 5412* (C); southwest side of Olancha Mountain, alt. 8500 ft., Tulare Co., 25-30 June 1904, *Hall & Babcock 5271* (C); plains along the Kern River, alt. 6000-7000 ft., Aug. 1895, *Purpus 1407* (C).

9. *F. puberulenta* Davidson in Bull. So. Calif. Acad. Sci. 11: 77. 1912. Pl. 14, fig. 7; pl. 15, fig. 2.

Perennial from a somewhat thickened tap-root; stem about 2.5 dm. high, erect, unbranched, foliose, closely puberulent throughout; leaves opposite, entire, white-margined, coriaceous, parallel-veined, puberulent; the basal leaves obovate, 5-10 cm. long, 1-5 cm. broad, gradually narrowing into a relatively long winged petiole; cauline leaves narrowly elliptical, 3-5 cm. long, 1.5 cm. broad; inflorescence a terminal somewhat open thyriform cyme; the peduncles clustered, 3-5 cm. long; the bracts opposite, foliaceous, 1-5 cm. long; calyx-lobes nearly distinct, narrowly lanceolate, slightly subulate, 1-1.5 cm. long, 2 mm. broad; corolla-tube shallow, crown lacking; the lobes oblong, 7 mm. long, 3 mm. broad, mucronate-setose, greenish white, conspicuously purple-dotted, bearing on the ventral surface a single oblong fimbriate fovea, saccate-sagittate at the base; capsules not seen.

Distribution: Inyo County, California.

Specimens examined:

CALIFORNIA: South Lake, Bishop Creek, Inyo Co., July 1911, *Davidson 2705* (C, LA TYPE).



10. *F. Parryi* Torr. Bot. Mex. Bound. Surv. 156. 1859; Gray, Syn. Fl. N. Am. 2<sup>1</sup>: 126. 1878. Pl. 14, fig. 1.

*Sweetia Parryi* (Torr.) O. Ktze. Rev. Gen. 2: 430. 1891.

"*Sweetia Parryi* (Torr.) Ktze," acc. to Jepson, Man. Fl. Pl. Calif. 767. 1925.

Perennial from a somewhat branched rhizome; stem 7-9 dm. high, erect, unbranched, scapose, terete, glabrous; leaves opposite, entire, more or less conspicuously white-margined, coriaceous, parallel-veined, glabrous; basal leaves subsessile, lanceolate, 10-15 cm. long, 1-2 cm. broad; cauline leaves sessile, lanceolate, 4-8 cm. long, 1-1.5 cm. broad; inflorescence a terminal, open, paniculate cyme; peduncles single in the axils, 4-6 cm. long; bracts opposite, foliaceous, broadly lanceolate, acute, 1-5 cm. long; calyx-lobes nearly distinct, broadly lanceolate, subulate, acute, 1-1.8 cm. long, 0.3-0.6 cm. broad; corolla-tube shallow, the corona reduced to cilia; the lobes ovate, narrowed at the base, 1.5 cm. long, 4-8 mm. broad, greenish-white, purple-dotted, bearing on the ventral surface near the base a single acute, lunate fovea; capsule 1.5-2 cm. long, 5-8 mm. broad, flattened contrary to the valves, partially enclosed within the persistent perianth; seeds oblong, 0.4 cm. long, 0.2 cm. broad, slightly thickened, rugose.

Distribution: southern California.

Specimens examined:

CALIFORNIA: between Walker's Ranch and the Jacumba, 1 June 1903, *Abrams 3701* (M, F); Witch Creek, San Diego Co., May 1894, *Alderson* (C); San Pedro Martin, 28 May 1893, *T. S. Brandegee* (C); Laguna Mts., San Diego Co., 20 June 1904, *T. S. Brandegee* (C); Ramona, Oct. 1903, *K. Brandegee* (C); east side of Palomar Mt., alt. 3500 ft., 11 July 1904, *Chandler 5468* (C); Badena, 15 Aug. 1884, *Coulter* (F); in the southeastern part of the Colorado Desert, San Diego Co., July 1890, *Gray* (M); San Diego, 1891, *Gregory* (C); in open pine forests in the vicinity of Strawberry Valley, alt. 5200 ft., July 1901, *Hall 2518* (C, M); Rincon Grade, 29 May 1926, *M. E. Jones* (C); summit of mountain near Crafton, San Bernardino Co., April 1876, *J. G. Lemmon* (F, C); San Bernardino, *J. G. Lemmon* (C); Jacumba Hot Springs, near Monument, 20 May 1894, *Mearns 3242* (M); Cuimaca

Mts., July 1875, *E. Palmer* 229 (M); *Parry & Lemmon* 232 (M, F); San Bernardino Co., June 1876, *Parry & Lemmon* (M); foothills, June 1887, *S. B. Parish* (F); dry mesas, alt. 350 m., San Bernardino Valley, 24 May 1909, *S. B. Parish* 7084 (C); lower foothills, 29 June 1888, *S. B. Parish* (C); lower hills, alt. 360-400 m., San Bernardino Valley, 24 May 1909, *S. B. Parish* 7084 (C); foothills, San Bernardino Mts., 7 June 1892, *S. B. Parish* 2415 (F); foothills, San Bernardino Mts., 25 April 1885, *S. B. Parish* 312 (C); vicinity of San Bernardino, alt. 100-2500 ft., 12 May 1897, *S. B. Parish* (M); foothills, 15 June 1888, *S. B. Parish* (M); San Jacinto Mt., July 1880, *Parish & Parish* 312 (F); open ground, Seven Oaks, San Bernardino Mts., June 1902, *White* 2 (C).

11. *F. albomarginata* Wats. Bot. King Exp. 280. 1871; Gray, Syn. Fl. N. Am. 2<sup>1</sup>: 126. 1878; Tidestrom in Contr. U. S. Nat. Herb. 25: 417. 1925. Pl. 14, fig. 3.

*Sweetia albomarginata* (Wats.) O. Ktze. Rev. Gen. 2: 431. 1891.

*Leucocraspedum albomarginatum* (Wats.) Rydb. Fl. Rocky Mts. 665. 1917, and ed. 2, 665. 1922.

"*Sweetia albomarginata* (Wats.) Ktze." acc. to Jepson, Man. Fl. Pl. Calif. 766. 1925.

Biennials or short-lived perennials from a thickened, somewhat woody tap-root; stem 2-6 dm. high, erect, unbranched, scapose, terete, glabrous; leaves 3-4-whorled, coriaceous, generally undulate, conspicuously white-margined, parallel-veined, glabrous; basal leaves sessile, oblanceolate, 5-10 cm. long, 0.8-1 cm. broad; cauline leaves sessile, linear, 2-8 cm. long, 0.4-0.8 cm. broad; inflorescence a terminal, corymbose cyme; the peduncles 0.5-10 cm. long, mostly solitary; bracts 1-6 cm. long, usually opposite, sometimes whorled, much-reduced in upper part of inflorescence; calyx-lobes nearly distinct, acute, somewhat subulate, 0.3-0.4 cm. long, 0.2 cm. broad; corolla-tube shallow, crown lacking; the lobes ovate-acuminate, 0.8-1 cm. long, 0.4-0.5 cm. broad, greenish-yellow, bearing on the ventral surface a linear, sparsely fringed obcordate fovea; capsule flattened contrary to the valves, partly enclosed within the persistent perianth; seeds oblong, 0.3-0.4 cm. long, wingless, rugose.

Distribution: southern Colorado to southern California.

Specimens examined:

COLORADO: Mesa Verde, July 1875, *T. S. Brandegee* 1249 (C); southwest Colorado, *T. S. Brandegee* 1215, 1249 (M); Mesa Verde, July 1889, *Eastwood* (C); rocky cedar barrens at summit of Soda Canyon, Tip-off Trail, Southern Ute Reservation, Montezuma Co., 27 June 1929, *Woodson & Anderson* 29006 (M).

UTAH: without locality, 1874, *Parry* 203 (G).

NEVADA: Pioche, 31 Aug. 1912, *M. E. Jones* (C); vicinity of Pioche, Lincoln Co., 28 June 1909, *Minthorn* (C).

ARIZONA: Oak Creek, 22 June 1883, *Rusby* (F).

CALIFORNIA: Providence Mts., San Bernardino Co., 6 June 1902, *T. S. Brandegee* (C); without locality, 1887, *E. Palmer* 305 (M).

11a. *Var. induta* (Tidestrom) Card, n. comb.

*Frasera induta* Tidestrom in Contr. U. S. Nat. Herb. 25: 417. 1925.

Finely glandular-puberulent throughout, in all other essential characters similar to the species.

Distribution: southern Nevada.

Specimens examined:

NEVADA: gravelly slopes, Cottonwood Creek Canyon, alt. 5000-6000 ft., Aug. 1896, *Purpus* 3065 (C); Charleston Mts., alt. 5000-6000 ft., May-Oct. 1898, *Purpus* 6083 (C); between Owens and Lee Canyon, alt. 7000 ft., 24 July 1913, *A. A. Heller* 10981 (M, C, G, F).

12. *F. paniculata* Torr. in Pacif. R. R. Rept. 4: 126. 1856; Gray, Syn. Fl. N. Am. ed. 2, 2<sup>1</sup>: 126. 1886; Wootton & Standl. in Contr. U. S. Nat. Herb. 19: 500. 1915. Pl. 14, fig. 2.

*Sweetia Bigelowii* O. Ktze. Rev. Gen. 2: 431. 1891.

*Frasera utahensis* Jones, Zoe 2: 19. 1891; Tidestrom in Contr. U. S. Nat. Herb. 25: 417. 1925.

Herbaceous, caulescent biennial or short-lived perennial, from a thickened somewhat woody tap-root; stem 7-10 dm. high, erect, unbranched, scapose, terete, glabrous; leaves opposite, entire, coriaceous, parallel-veined, glabrous; basal leaves lanceo-

late-acuminate, 10–20 cm. long, 1.5–4 cm. broad, slightly contracted at the base; the lower cauline leaves opposite, 8–10 cm. long, 1–1.5 cm. broad, clasping at the base; the upper leaves reduced to mere bracts; inflorescence a terminal, open panicle; peduncles usually solitary in the axils; bracts opposite, 2–10 cm. long; calyx-lobes nearly distinct, broadly ovate, 0.4 cm. long, 0.2 cm. broad, either acute or acuminate, whitish-margined; corolla-tube shallow, lacking a conspicuous crown; the lobes oblong-obovate, 1 cm. long, 0.7 cm. broad, tapered at the base, yellowish-green, purple-dotted, bearing on the ventral surface 2 oblong, linear, fimbriate, urn-shaped foveae with a conspicuous apical tooth; capsule 1.5 cm. long, 0.5 cm. broad, flattened contrary to the valves, partially enclosed within the persistent perianth; seeds 10–20, generally oblong, 0.7 cm. long, 0.3 cm. broad, closely appressed, unequally thickened, brown, pitted, rugose or irregularly tuberculate, somewhat winged-margined.

Distribution: New Mexico, Arizona, and adjacent Utah.

Specimens examined:

NEW MEXICO: along road northwest of Lybrook's Trading Post (Haynes), Rio Arriba Co., 4 July 1929, *Mathias 616* (M).

UTAH: near Moab, 16 June 1913 (G); Courthouse Wash, *M. E. Jones* (C).

ARIZONA: sand bluffs, Inscription Rock, Zuni Country, 18 Nov. 1853, *Bigelow* (G TYPE); House Rock, 18 June 1890, *M. E. Jones* (C); in sand on high mesa only, Navajo Reservation, July 1916, *Vorhies 43* (M, C, G); *Voth 80* (F); Pahrnagath Mts., 1871, *Searls* (G).

#### LIST OF EXSICCATAE

The distribution numbers are printed in *italics*. The number in parenthesis is the species number used in this revision.

Abrams, L. R. *3701* (10).

Abrams, L. R. & E. A. McGregor, *628*

(4).

Aiton, G. B. — (6a).

Alderson, R. D. — (10).

Anect, Bro. *134* (1).

Austin, Mrs. R. M. — (6).

Austin, S. W. *117* (8).

Baker, C. F. *524, 525, 947* (1).

Baker, C. F., F. S. Earle & S. M. Tracy  
*271* (1).

Baker, M. S. — (6).

Baker, M. S. & F. Nutting — (6).

Barlow, B. — (1).

Bidwell, Mrs. J. — (6).

Bigelow, J. M. — (12).

Blumer, J. C. —, *1619* (1).

Bolander, H. N. *6361* (1).

- Brandegee, K. — (6); — (10).  
 Brandegee, T. S. 14840 (1); — (6); — (10); —, 1215, 1249 (11).  
 Brown, H. E. 545 (6).  
 Brumbach, F. M. & C. A. Davies, 115 (1).  
 Butler, G. B. — (6).  
 Camp, S. H. & D. R. — (2).  
 Carleton, M. A. — (1).  
 Chandler, H. P. 1383, 1486 (6); 5468 (10).  
 Churchill, J. R. —, 659 (2).  
 Clemens, Mrs. J. — (1).  
 Clements, F. E. & E. S. 192 (1).  
 Congdon, J. W. — (6).  
 Coulter, J. M. — (10).  
 Crandall, C. S. —, 1490 (1).  
 Culbertson, 4329 (8).  
 Cusick, W. C. 2226 (6); 1427, 1920 (6b); 1635 (7).  
 Davidson, A. 2705 (9).  
 Davy, J. B. 5737 (6).  
 Drushel, J. A. — (2).  
 Eastwood, A. 552, 950, 1945 (6); 4329 (8); — (11).  
 Eggert, H. — (2).  
 Ellis, C. C. 152 (1).  
 Elmer, A. D. E. 340, 802, 1688 (3); 3609 (4); 823 (6a).  
 English, C. Jr., 994 (6a).  
 Engelmann, G. — (1); — (2); — (6).  
 Engelmann, H. — (1).  
 Epling, C. C. & M. Houck, 9147 (3).  
 Fendler, A. 686 (1).  
 French — (2).  
 Goodding, L. N. 1255 (1).  
 Gray, I. J. — (10).  
 Gregory, Mrs. — (10).  
 Greene, E. L. 856 (6).  
 Greenman, J. M., E. Larsen & M. Beardsley — (2).  
 Hall, E. & J. P. Harbour 553 (1).  
 Hall, H. M. 1243, 1495, 6462, 6485, 6534, 6706 (4); 8546, 9594, 10157 (6); 2518 (10).  
 Hall, H. M. & E. B. Babcock 4006, 4241 (6).  
 Hall, H. M. & H. D. Babcock 5271, 5401, 5412 (8).  
 Hall, H. M. & H. P. Chandler 716 (1).  
 Hammond, E. W. 277A (6).  
 Hansen, G. —, 595 (1).  
 Harper, E. T. & S. A. 4959 (1).  
 Harris, J. A. C. 16296 (1).  
 Hasse, H. E. — (2).  
 Hayden, F. V. — (1).  
 Hedgecock, G. G. — (1).  
 Heller, A. A. 5883 (1); —, 7879, 10087, 12103 (6); —, (6a); 10981 (11a).  
 Heller, A. A. & G. 3285 (3); — (6a).  
 Heller, A. A. & P. B. Kennedy, 8820 (6).  
 Henderson, L. F. 3558, 5324 (1); 2271 (3); 467 (6).  
 Hilgard, T. — (2).  
 Holzinger, J. M. — (1).  
 Howell, T. J. — (6).  
 Jepson, W. L. — (6).  
 Johnston, E. L. 770B (1).  
 Jones, M. E. —, 5710, 1878 (1); — (6); — (10); — (11); — (12).  
 Jones, W. W. — (1); 222 (6).  
 Kellogg, J. H. 1931 (2).  
 Kelsey, F. D. — (1).  
 Leiberg, J. B. 2426 (1); 213, 1064 (3); 227 (6); 227 (7).  
 Lemmon, J. G. — (6); — (10).  
 Letterman, G. W. 309 (1).  
 Lyall, D. 1680 (6).  
 Macbride, J. F. 961 (7).  
 MacDougal, D. T. 236 (1).  
 Mathias, M. E. 616 (12).  
 Mearns, E. A. 3242 (10).  
 Metcalfe, O. B. 411, 1160 (1).  
 Minthorn, M. — (11).  
 Moore, Mrs. — (1).  
 Mulford, A. I. — (5); — (7).  
 Munz, P. A. 6830, 6947, 10640 (4).  
 Murdoch, J. 4098 (1).  
 Muir, J. 5024 (1).  
 Neally, G. C. 81 (1).  
 Nelson, A. 935, 7516 (1).  
 Nelson, A. & E. 5629 (1).  
 Overholts, L. O. — (1).  
 Palmer, E. 304 (1); 229 (10); 305 (11).  
 Palmer, E. J. 31322 (1); 15132, 17689, 18075, 25210 (2).  
 Pammel, L. H. 42 (1).  
 Parish, S. B. 10921 (4); —, 312, 2415, 7084 (10).  
 Parish, W. F. & S. B. —, 1474 (4); 1474 (6); 312 (10).  
 Parry, C. C. 310 (1); 203 (11).

- Parry, C. C. & J. G. Lemmon, —, 232 (10).  
 Patterson, H. N. 243 (1).  
 Payson, E. B. & E. Bethel, 1153 (1).  
 Payson, E. B. & L. B. 1893 (1); 1796 (6a); 1796 (6b).  
 Peck, M. E. 4501 (6); 15174 (6a).  
 Piper, C. V. 1618 (3); 1619 (6a).  
 Pratt, A. D. — (1); 1618 (3), 1619 (6a).  
 Price, S. F. — (2).  
 Pringle, C. G. — (1).  
 Purpus, C. A. 304 (1); 1407 (8); — 3065 (11a).  
 Redfield, J. H. — (1).  
 Rose, J. P. 1624 (6).  
 Rothrock, J. T. 251 (1).  
 Rusby, H. H. — (11).  
 Russell). (2, C. —  
 Rydberg, P. A. & E. A. Bessey 4698 (1).  
 Sandberg, J. H. — (3); — (6a).  
 Sandberg, J. H., D. T. MacDougal & A. A. Heller 239 (3); 101 (6a).  
 Scribner, F. L. 156 (1).  
 Searls, Miss — (12).  
 Sheldon, E. P. 8344 (6a).  
 Small, J. K. — (2).  
 Smith, H. H. 405 (2).  
 Smith, L. E. 235 (6).  
 Snow, F. H. — (1).  
 Spalding — (3).  
 Standley, P. C. 4034 (1).  
 Starz, E. — (1).  
 Stokes, S. G. — (1).  
 Suksdorf, W. N. 938, 939 (3); —, 40, 161 (6); — (6a).  
 Thompeon, J. W. 2851 (6a).  
 Tracy, J. P. 2244 (6).  
 Tracy, S. M. 1348 (2).  
 Trelease, W. — (1); 1130 (2).  
 Tuthill, F. H. 9 (2).  
 Vorhies, C. T. 43 (12).  
 Voth, H. R. 80 (12).  
 Watson, S. 270 (3).  
 White, J. 2 (10).  
 Wislizenus, F. 343 (2).  
 Wolf, J. — (1).  
 Woodson, R. E., Jr. & E. Anderson 29006 (11).  
 Young, A. H. — (2).

# INDEX TO SPECIES

New combinations are printed in **bold face type**; synonyms in *italics*; and previously published names in ordinary type.

	Page		Page
<i>Fraseria</i> .....	245, 256	<i>macrophylla</i> .....	259
<i>albicaulis</i> Dougl. ex Griseb.....	246, 269	<i>montana</i> .....	247, 266
" <i>albicaulis</i> Griseb.".....	269	<i>neglecta</i> .....	247, 255, 265
<i>albicaulis</i> f. <i>alba</i> .....	269	<i>nitida</i> .....	246, 247, 249, 250, 254, 267
<i>albomarginata</i> .....	248, 249, 274	<i>nitida</i> var. <i>albicaulis</i> .....	269
<i>albomarginata</i> var. <i>induta</i> .....	275	<i>nitida</i> var. <i>albida</i> .....	267
<i>ampla</i> .....	259	<i>nitida</i> var. <i>Cusickii</i> .....	270
<i>angustifolia</i> .....	259	<i>officinalis</i> .....	262
<i>carolinensis</i> .....	262	<i>paniculata</i> .....	246, 247, 248, 255, 275
<i>caroliniensis</i> .....		<i>Parryi</i> .....	246, 248, 249, 255, 273
245, 249, 251, 253, 254, 255, 258, 262		<i>puberulenta</i> .....	255, 272
<i>coerulea</i> .....	253, 254, 255, 271	<i>speciosa</i> .....	
<i>Cusickii</i> .....	270	246, 247, 249, 250, 254, 255, 258	
<i>fastigiata</i> .....		<i>speciosa</i> var. <i>angustifolia</i> .....	259
247, 248, 250, 251, 254, 255, 264		<i>speciosa</i> var. <i>scabra</i> .....	259
<i>induta</i> .....	275	<i>speciosa</i> var. <i>stenosepala</i> .....	259

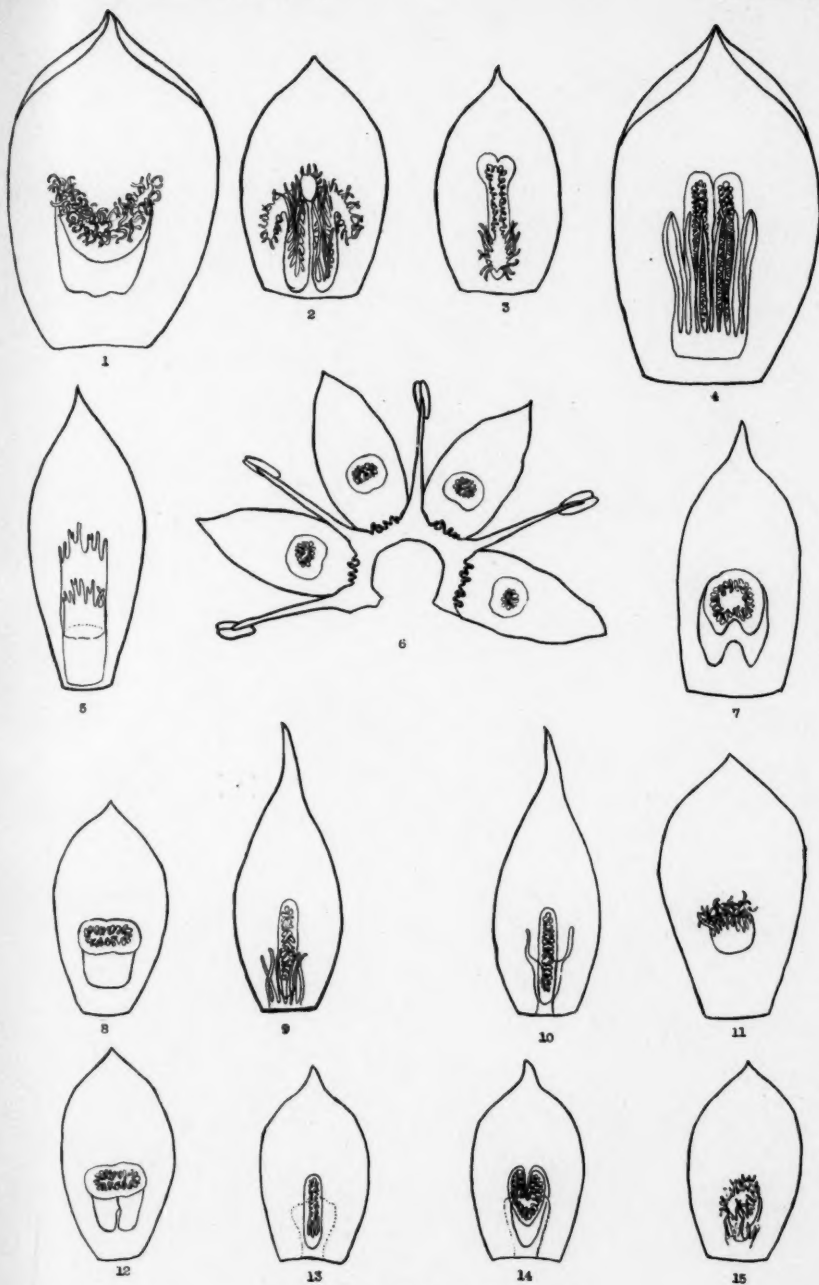


	Page		Page
<i>stenosepala</i> .....	259	<i>radiata</i> .....	259
<i>thyrsiflora</i> .....	246, 264	<i>Swertia</i> .....	245, 247
<i>tubulosa</i> .....	271	<i>Swertia</i> .....	257
<i>utahensis</i> .....	275	<i>albomarginata</i> .....	274
<i>venosa</i> .....	259	<i>difformis</i> .....	262
<i>verticillata</i> .....	246, 262	<i>fastigiata</i> .....	264
<i>Walteri</i> .....	245, 262	<i>Frasera</i> .....	262
<i>Leucocraspedum</i> .....	257	<i>neglecta</i> .....	265
<i>albicaule</i> .....	269	<i>nitida</i> .....	267
<i>albomarginatum</i> .....	274	<i>Parryi</i> .....	273
<i>coeruleum</i> .....	271	<i>tubulosa</i> .....	271
<i>montanum</i> .....	266	<i>Tessaranthium</i> .....	257
<i>Mesadenia</i> .....	246, 257	<i>angustifolium</i> .....	259
<i>Sweetia</i> .....	257	<i>macrophyllum</i> .....	259
<i>albicaulis</i> .....	269	<i>scabrum</i> .....	259
<i>albomarginata</i> .....	274	<i>speciosum</i> .....	259
<i>Bigelovii</i> .....	275	<i>stenosepalum</i> .....	259
<i>carolinensis</i> .....	262	<i>Tessaranthium</i> .....	246, 257
<i>fastigiata</i> .....	264	<i>radiatum</i> .....	259
<i>Parryi</i> .....	273		

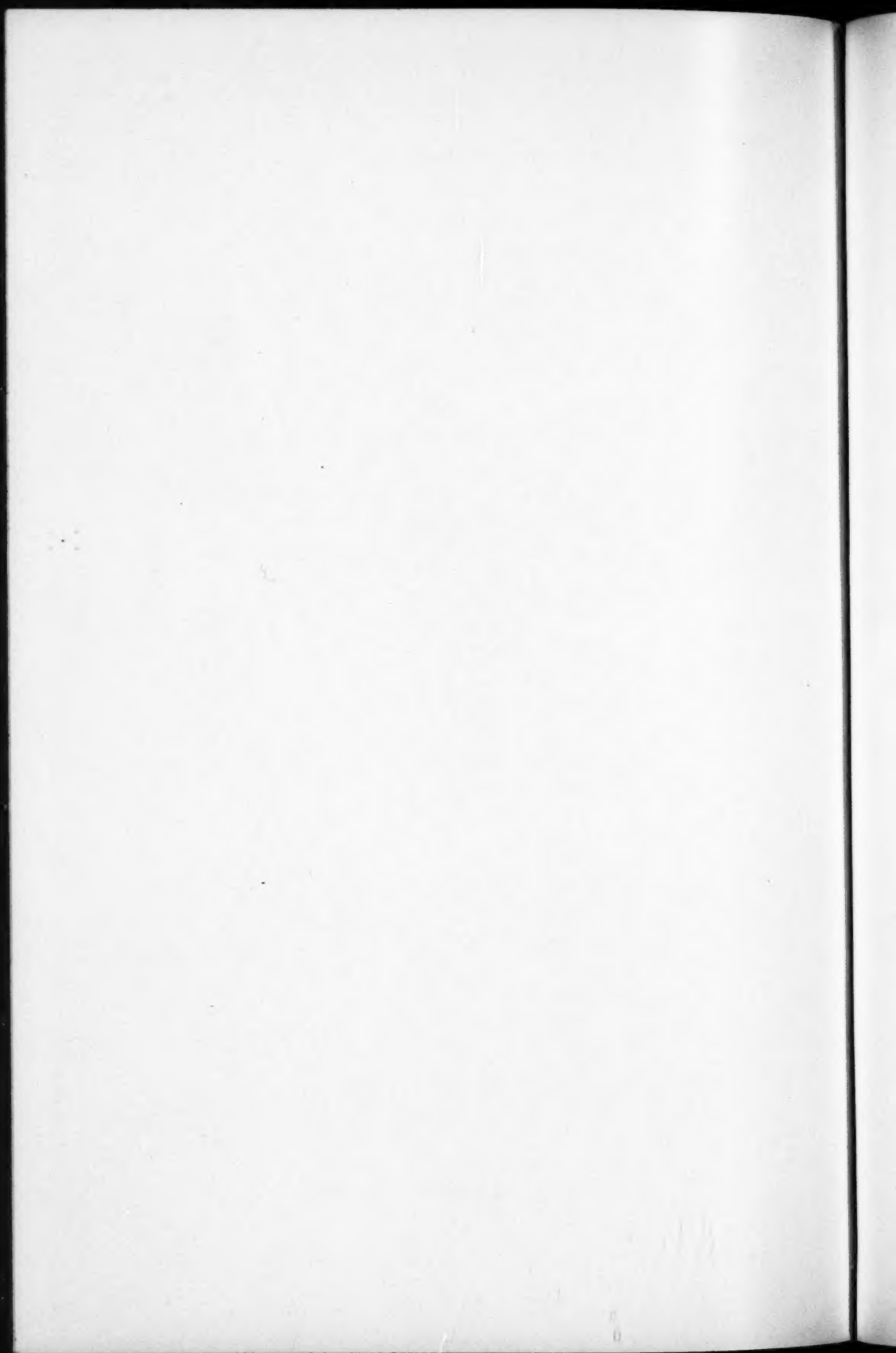
## EXPLANATION OF PLATE

## PLATE 14

- Fig. 1. *F. Parryi*. Corolla-lobe and lunate fovea.  $\times 6$ .  
Fig. 2. *F. paniculata*. Corolla-lobe and foveae.  $\times 6$ .  
Fig. 3. *F. albomarginata*. Corolla-lobe and fovea.  $\times 6$ .  
Fig. 4. *F. speciosa*. Corolla-lobe, foveae and crown.  $\times 6$ .  
Fig. 5. *F. tubulosa*. Corolla-lobe and saccate fovea.  $\times 6$ .  
Fig. 6. *F. caroliniensis*. Corolla, stamens and reduced crown.  $\times 6$ .  
Fig. 7. *F. puberulenta*. Corolla-lobe and fovea.  $\times 6$ .  
Fig. 8. *F. neglecta*. Corolla-lobe and fovea.  $\times 6$ .  
Fig. 9. *F. nitida* var. *albicaulis*. Corolla-lobe, fovea and crown.  $\times 6$ .  
Fig. 10. *F. nitida* var. *Cusickii*. Corolla-lobe, fovea and petaloid crown.  $\times 6$ .  
Fig. 11. *F. fastigiata*. Corolla-lobe and fovea.  $\times 6$ .  
Fig. 12. *F. neglecta*. Corolla-lobe with partly fused foveae.  $\times 6$ .  
Fig. 13. *F. nitida*. Corolla-lobe, fovea, and crown.  $\times 6$ .  
Fig. 14. *F. nitida*. Corolla-lobe, foveae almost fused.  $\times 6$ .  
Fig. 15. *F. montana*. Corolla-lobe, fovea, and crown.  $\times 6$ .



CARD—REVISION OF FRASERA





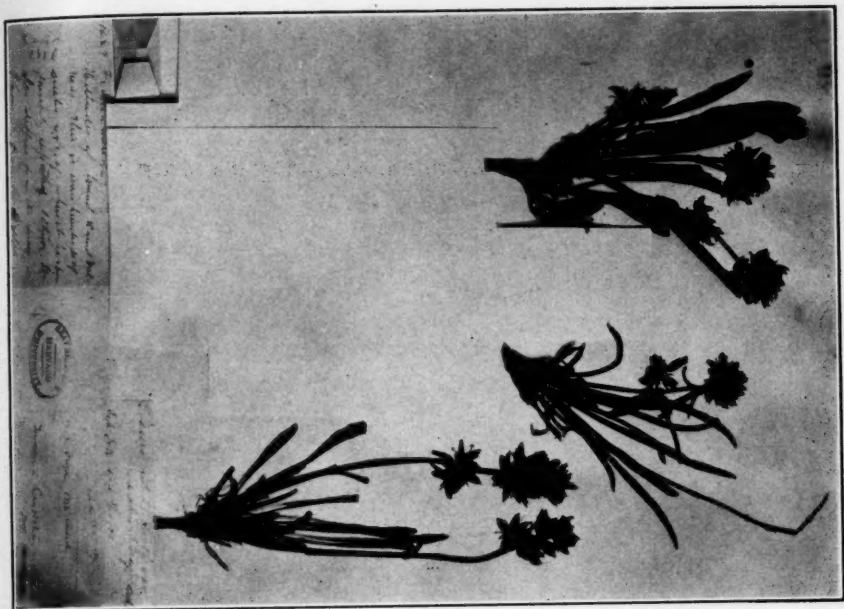
## EXPLANATION OF PLATE

## PLATE 15

Fig. 1. Photograph of the type specimen of *Frasera nitida* Benth. var. *Cusickii* (Gray) Card, in the Gray Herbarium of Harvard University.

Fig. 2. Photograph of the type specimen of *Frasera puberulenta* Davidson, in the Herbarium of the Los Angeles Museum.







## NOTES ON THE DISTRIBUTION OF SOME ROCKY MOUNTAIN PLANTS<sup>1</sup>

GEORGE J. GOODMAN

*Rufus J. Lackland Research Fellow in the Henry Shaw School of Botany of  
Washington University*

A study of three collections of plants (Payson and Payson, 1926, and the writer's of 1927 and 1928) from the Uintah Mountains, Utah, revealed noteworthy extensions of the known ranges of a few species. These species, it will be noted, have their apparent centers of distribution in regions to the northwest and west of their newly discovered stations.

The Uintah Mountains, situated in the north-central part of Utah between the 40th and 41st parallels, extend from the Wahsatch range nearly eastward to northwestern Colorado, a distance of one hundred and twenty-five miles. They are the highest mountains in Utah, several of the peaks approximating 13,500 feet in altitude.

The foothills, which average about 8000 feet in altitude, are characterized by such typical regional plants as *Eriogonum heracleoides* Nutt., *Orthocarpus Tolmiei* H. & A., and the common Utah *Mertensia*, *M. Leonardi* Rydb. Large alpine meadows present a remarkably rich flora, and even such plants as *Parrya platycarpa* Rydb. and *Papaver alpinum* L. were found by the writer in plentifulness.

With the exception of the *Hesperochiron*, the collections of the following species are, so far as the writer knows, the only ones from Utah. These new localities extend eastward and southward the previously known geographical ranges of the species here recorded.

The Payson plants and the Goodman-Hitchcock specimen, cited below, are in various herbaria in this country. The Goodman plants are in his private collection, a nearly complete set of duplicates in the Rocky Mountain Herbarium, and the triplicates are in the Herbarium of Mr. George E. Osterhout, Windsor, Colorado.

<sup>1</sup> Issued June 30, 1931.

*Arenaria cephaloidea* Rydb. Bull. Torr. Bot. Club 39: 316. 1912.

The specimen at hand agrees in all essential morphological characters with Rydberg's description.

UTAH: on dry rocky slopes, Uintah Mts., Summit Co., 8000 ft. alt., 29 July 1927, *Goodman 235*.

The previous known range is the submontane region of Washington and Idaho.

*Lesquerella Kingii* Wats. Proc. Am. Acad. 23: 251. 1888.

UTAH: stony ridge on top of peak near West Fork of Bear River, Uintah Mts., Summit Co., 11,000 ft. alt., 7 July 1926, *E. B. & L. B. Payson 4901*; dry rocky soil, ridge east of East Fork of Bear River, Uintah Mts., about 11,000 ft. alt., 17 July 1928, *Goodman 528*; dry, gravelly soil, east of East Fork of Bear River, Uintah Mts., 10,500 ft. alt., 10 July 1930, *Goodman & Hitchcock 1505*.

Payson's 4901 was distributed as an unpublished variety of *Lesquerella prostrata* A. Nels.

In Payson's<sup>2</sup> monograph of the genus the distribution is given as "Nevada and southeastern California." Payson comments that "*Kingii* has not yet been collected in Utah. . ." The Utah collections extend the known range eastward about 375 miles.

*Dodecatheon tetrandrum* Suksdorf ex Greene, *Erythea* 3: 40. 1895.

UTAH: meadows along margin of lake, east of Stillwater Fork, Uintah Mts., 10,100 ft. alt., 17 July 1926, *E. B. & L. B. Payson 5013*; margin of small lake, Uintah Mts., 10,500 ft. alt., 27 July 1927, *Goodman 220*.

The type of this species was collected in Washington, and the most southern or eastern stations heretofore known are western Nevada and Oregon. The Utah collections extend the range over 400 miles. The significance of this distribution can be more accurately evaluated after the status of the species is better known.

*Hesperochiron pumilus* (Griseb.) Porter in Hayden, Rept. Geol. Surv. 778. 1873; Brewer & Watson, Bot. Calif. 1: 517. 1876; Gray, Syn. Fl. N. A. 2<sup>1</sup>: 173. 1878; Jepson, Man. Fl. Pl. Calif. 835. 1925.

<sup>2</sup> Payson, E. B., Monograph of *Lesquerella*. Ann. Mo. Bot. Gard. 8: pp. 216-217. 1921.



Fig. 1. Map of the western United States, showing the distribution of three species of plants.

- |                                     |   |
|-------------------------------------|---|
| <i>Lesquerella Kingii</i> .....     | — |
| <i>Dodecatheon tetrandrum</i> ..... | X |
| <i>Mertensia incongruens</i> .....  | ⊙ |

*Villarsia pumila* Griseb. in Hook. Fl. Bor.-Am. 2: 70, pl. 157 B. 1838; Griseb. Gen. et Sp. Gent. 338. 1839.

*Capnorea pumila* Greene, Erythea 2: 193. 1894; Tidestrom in Contr. U. S. Nat. Herb. 25: 449. 1925.

In accepting the generic name *Hesperochiron*, accordance is made with the list of Nomina Conservanda in the International Rules of Botanical Nomenclature (1906).

UTAH: moist soil near West Fork of Bear River, Uintah Mts., 9800 ft. alt., 7 July 1926, *E. B. & L. B. Payson 4925*; in damp sod, foothills of Uintah Mts., 7900 ft. alt., 26 June 1928, *Goodman 401*.

Most of the herbarium specimens examined are from Idaho, Washington, Oregon, and Montana. One specimen, collected by Aven Nelson, is from Evanston, Wyoming, only a short distance from the Utah station.

*Mertensia incongruens* Macbr. & Payson, Contr. Gray Herb N. S. 49: 66. 1917.

UTAH: rocky slope, Uintah Mts., 11,300 ft. alt., 30 July 1927, *Goodman 257*.

The type of this species was collected in Blaine County, Idaho. Collections since then (excepting the specimen cited above), as represented in the herbarium of the Missouri Botanical Garden and the Rocky Mountain Herbarium, have all been collected by the Paysons and are from Idaho, Teton Pass, Wyoming, or Sublette County in west-central Wyoming.

The range for this species is thus extended southward about 175 miles.

The writer wishes to thank Dr. Aven Nelson, Curator of the Rocky Mountain Herbarium, for having checked over a few specimens at that institution, and Dr. J. M. Greenman, who has characteristically aided generously and critically.



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